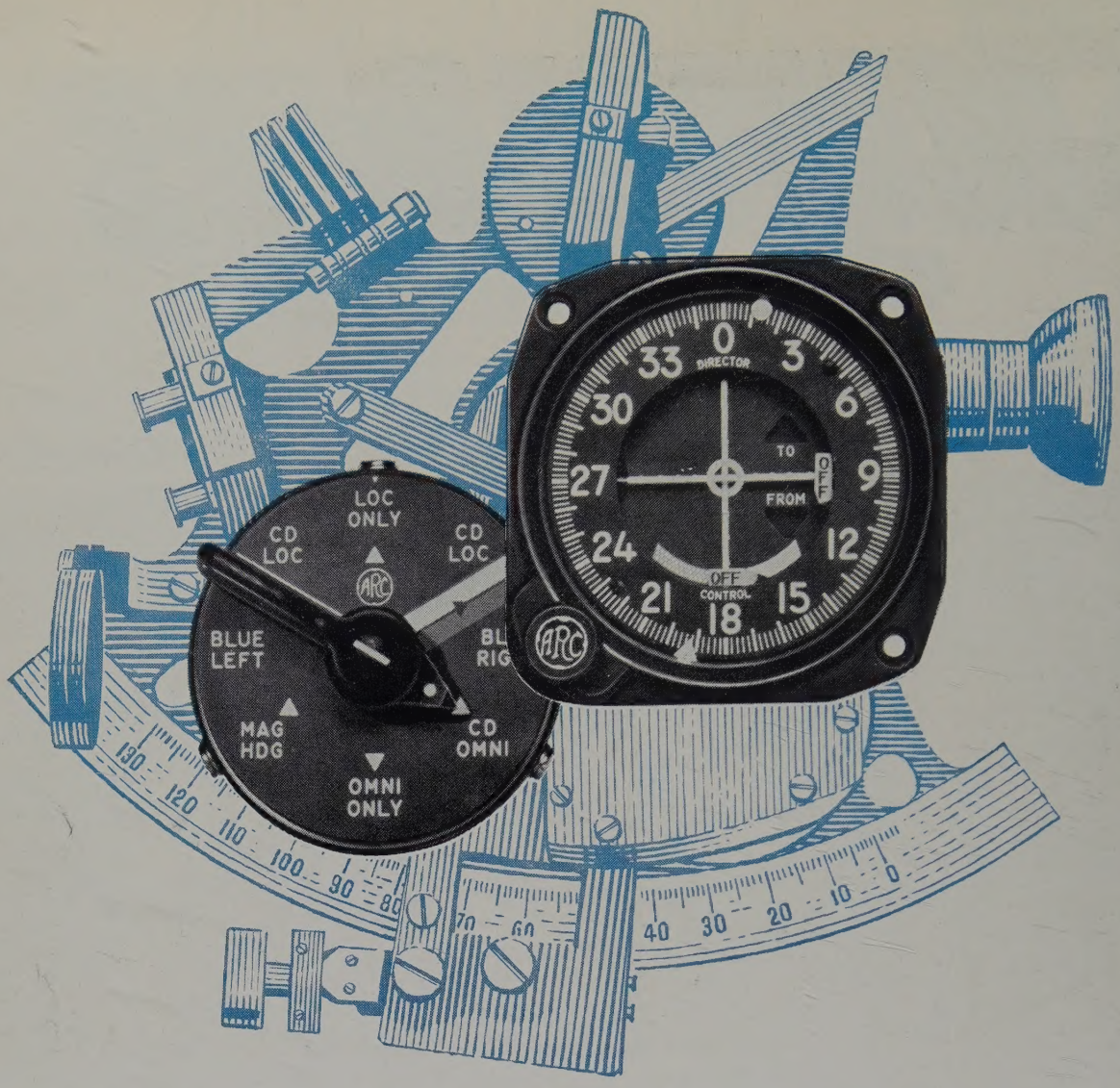
AUGUST 1957

Skyways FOR BUSINESS

NATIONAL BUSINESS AIRCRAFT ASSOCIATION OFFICIAL PUBLICATION

CREW OF 1956 "FLAGSHIP—U.S. INDUSTRIAL FLEET"

- Search For Accident Causes
- CAA Federal Airway Plan
- Business Aircraft: Yesterday, Today & Tomorrow
- Reading Aviation Annual Maintenance & Operations Meeting



NEW LOOK in navigation aids

ARC's Course Director CD-1, Teamed with ARC's Dual VOR/ Localizer Receivers 15-D, Shares the Work with the Pilot

More and more pilots rely on the ARC CD-1 Course Director to determine the exact headings required to intercept and fly a desired VOR radial or runway localizer. This electronic "co-pilot" helps them fly with pinpoint precision, greater ease and increased safety, and in four simple steps.

With ARC's CD-1, the pilot selects his VOR or localizer station, sets his Course Director to the bearing of the desired VOR radial or localizer, turns his aircraft until the vertical needle of the cross-pointer meter is centered and steers to keep it centered. His ship will intercept the selected track quickly and smoothly, simultaneously compensating for wind drift. The pilot performs no mental computations, and there's no chance of overshooting the desired course.

This reliable navigational aid adds only 10 pounds to your aircraft. Ask your ARC dealer to install the CD-1, along with a *dual installation* of ARC's Type 15-D VOR/Localizer Equipment. You'll discover how easy flying VOR and Localizers can be — and with new peace of mind.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, NEW JERSEY

Miniaturized Automatic Direction Finders
Omni/Loc Receivers • Course Directors • UHF and VHF Receivers and Transmitters • LF Receivers and Loop Direction Finders • 10-Channel Isolation Amplifiers • 8-Watt Audio Amplifiers • Interphone Amplifiers
Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators

AUGUST, 1957

Skyways FOR BUSINESS

The official publication of the National Business Aircraft Association

COVER: W. R. "Rip" Strong (center), Capt. of National Dairies' DC-3, holds "Best-of-Class" trophy; J. P. Hellebrand, Co-pilot (right), holds coveted award designating the DC-3 the "Flagship of the U. S. Industrial Fleet." Presentation of the award was a highlight of Reading Aviation's Annual Maintenance & Operations Meeting. On left is Walter Richmond, Maintenance chief of the 1956 "Flagship." National Dairies' DC-3 also was awarded title of "Best Exterior" for twin-engined aircraft in the 12,000 lb-and-over class at show.

FOUNDED BY J. FRED HENRY, 1942
EDITOR & PUBLISHER
LOIS HENRY
EDITORIAL ASSISTANT
George Watts
CONTRIBUTING EDITORS
Capt. Chuck Banfe—West Coast
Karl Hess—Fuels & Oils
Herbert O. Fisher—Flight Evaluations

SALES & PUBLIC RELATIONS
I. R. Ackerman

BUSINESS & PRODUCTION MANAGER
Stanley M. Cook

READER SERVICE CIRCULATION
Philip E. Woldenberg

ADVERTISING OFFICE, 425 Fourth Ave., N. Y. 16, N. Y. Tel. MU 9-2684
MIDWEST—Richard P. McClanahan, 333 No. Michigan Ave., Chicago 1, Ill. Tel. DEarborn 2-0196
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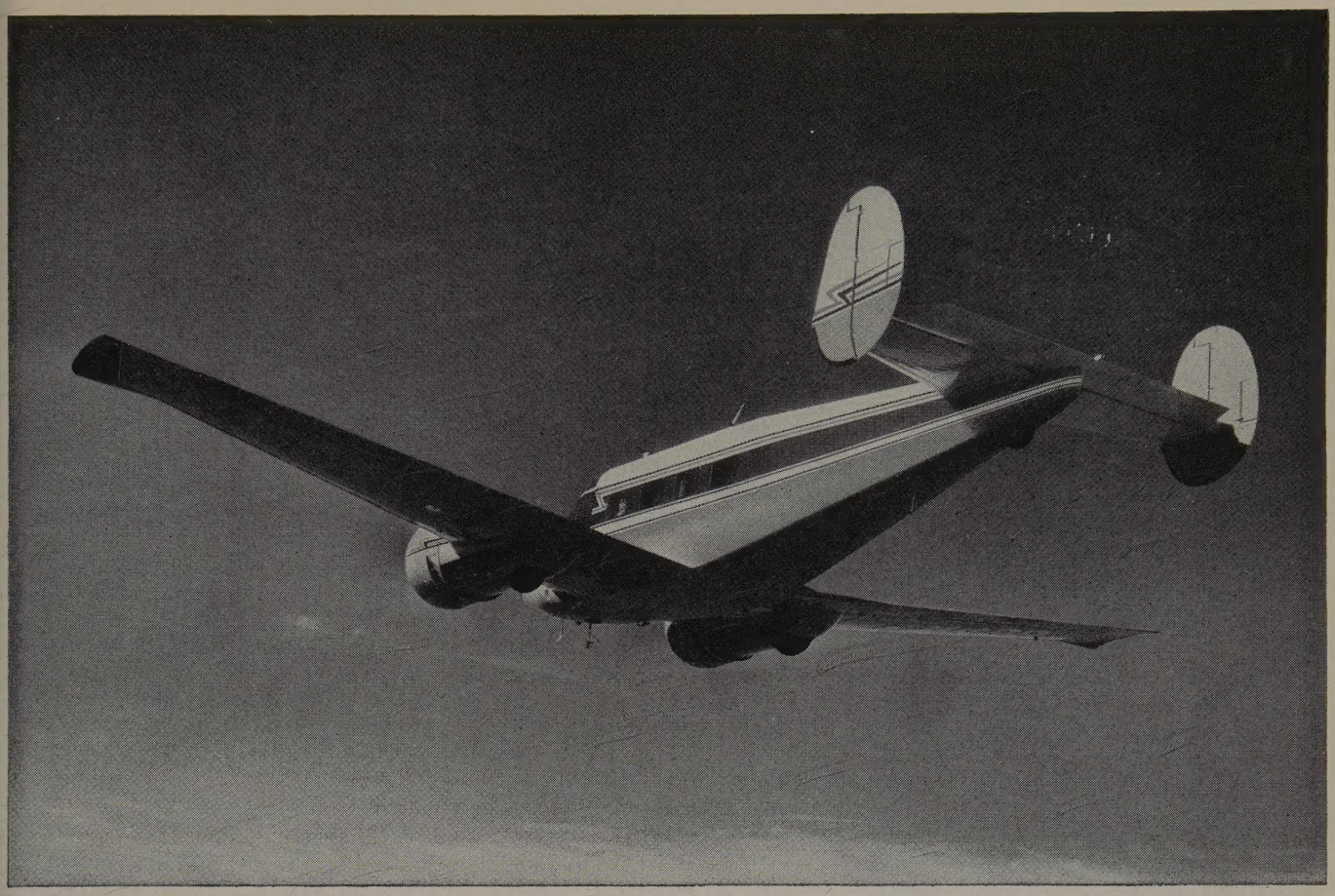

men in motion

Look up. That graceful Beechcraft is a symbol of successful men moving swiftly, surely toward a rendezvous with progress. Their decisions are backed by **action.**

They fly in a Beechcraft Super 18.

The Super 18 is the **most complete answer** to the vastness of today's business opportunities. In range, in speed, in precision engineering, the Beechcraft Super 18 holds an exclusive position in executive air transportation.

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Eight-Place BEECHCRAFT Super 18. Range — up to 1,626 miles. Speed — up to 234 miles-per-hour.

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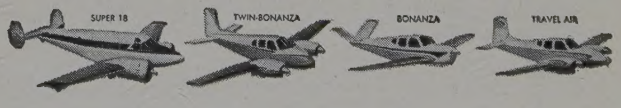


BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Editorial

"OFF AGIN—ON AGIN—GONE AGIN . . ."

The famous incident involving the railroader who was chided for being too long-winded, who was ordered to make future reports briefer, and who shortly thereafter reported a railroad wreck to his superiors by wiring, "Off Again, on agin, gone agin. Finegan" is classic.

Finegan's wire could also well describe the changing state of the aircraft industry. The whole history of our country's aviation industry has been the ups and downs of off again, on again, gone again. Feast or famine seems to have been its lot. The very nature of this great industry, supplier as it is to our nation's armed might, has resulted in its fortunes being swept by the tides of political and military change.

Today the aviation industry faces three very potent challenges—the present *national economy wave*, the political aspects of *disarmament talks*, and the military trend toward *remote-controlled supersonic missiles* which are being designed to one day replace man-piloted military aircraft.

Students of history and political sociology should be able to evaluate these trends in clear perspective, to project future human requirements and to determine whether temporary economic retrenchment, disarmament and/or electronic remote controls are singly or collectively capable of actually hindering aviation's destined growth. The answer will be found in the pages of history which well-record the forces that have motivated a constantly improving system of transportation.

Just as the wheel replaced the drag stick, as the horse replaced the footpath, as powered ships replace sailing vessels, as trains, automobiles and trucks replaced chariots, buggies and prairie schooners—so are aircraft surely replacing slower means of transportation where time and distance are factors of consideration. This is true whether by land or sea.

Here, clearly, is a distinct change in the mode of life for the entire human race and so it seems destined to be for generations upon generations to come. Logistics, human needs for the efficient movement of men and of materials, make it so.

The air ocean is the true highway of tomorrow. Economy waves, disarmament or what have you will not long stay its ever-upward spiraling use.

As one "for instance," who in 1947 would have dared predict that ten years hence there would be twenty-four thousand airplanes owned and operated solely for American business?

Our foresight need be no better than our hindsight to predict that temporary interruptions in the progress of aviation are actually no more than paltry tolls along the gateways to progress.

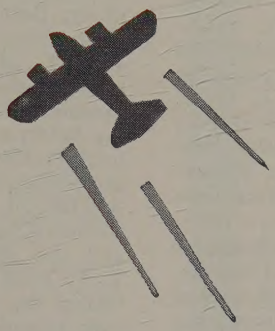
The fact that we may seem to think that we are "off agin" does not mean that we won't soon be "on agin"—and—"gone agin."

TIME FLIES

October 2-3-4 are literally just around the corner; a scant 60 days away.

Have you made your reservations yet for the 10th Annual Forum and Meeting of NBAA which will be held in Denver on these dates?

From the plans that are shaping up, this 10th Anniversary Meeting will be an outstanding event and one no one connected with business aviation can afford to miss it. Make your reservations now! Remember: Time Flies.



UP NEW ENGLAND WAY OR DEEP IN DIXIE *Esso is there . . . at 600 airports from Maine to Texas!* Now, flying's a real pleasure — when you stop at any Esso Aviation Dealer's. (And there's bound to be one just about anywhere you go!) They'll relieve you of servicing worries and keep you on schedule. If you have an Esso Credit Card, it's even better. Because then you can charge not only gasoline, oil and lubrication, but tire and battery service, landing fees, overnight in-transit storage and most minor emergency repairs. Make a note: next trip get your service from an Esso Aviation Dealer.

FREE TO PILOTS! See your nearby Esso Aviation Dealer for your free copy of "The Esso Co-Pilot" — a complete directory of Esso Aviation Dealers.

NBAA Director's Notes

• TURBO-PROP FORUM, one of the highlights of 10th Annual Meeting and Forum in Denver, receiving tremendous response from airframe and engine manufacturers. Just as important—turbo-prop aircraft users such as Capital Air Lines will give NBAA members and guests the "user" story telling of actual turbo-prop operational experiences. October 2-3-4 are meeting dates, with turbo-props dominating the proceedings on October 4th.

• MONTHLY MAINTENANCE DIGEST, a review of pertinent airframe, engine and accessories malfunctions compiled from CAA reports on all types of aircraft used in business flying, is the most recently added service to NBAA members.

• Daily maintenance reports received by CAA from airline and general aviation field reports are reviewed, compiled and edited by NBAA Headquarters staff to alert NBAA members to actual and potential trouble areas.

• FLAGSHIP OF THE BUSINESS AIRCRAFT FLEET for 1957 is the smartly styled DC-3 flown by NBAA member NATIONAL DAIRY PRODUCTS CORPORATION. Chief Pilot "Rip" Strong received the award at the popular Reading Aviation Service (also staunch NBAA member) annual air show held recently at Reading, Pa.

• Among NBAA pilots and members at the show were: George Weiss (Sperry); David Dows (Airwork); George Bevins (George Brewster & Son); Norm Wolberg (Dallas Airmotive); DortheAnne Horton (Horton & Horton); Gil Quinby (NARCO); Stan Smith (New York Wire Cloth); George Rand (Hobart A. H. Cook Associated); and K. R. Duee (Safe Flight Instruments).

Apologies to the many other NBAAers who were there and whose names aren't included . . . there were so darned many of us enjoying Sime Bertolet's wonderful hospitality!

• San Diego's attempt to get a municipal airport capable of handling jet airline traffic (which Lindbergh Field can't handle) was effectively blocked by U. S. Navy officials. Even more galling was Navy's citing of New Iberia, Louisiana, as a case in point regarding conflicting navy/civil air traffic. The record shows that the Navy absolutely disregarded all established procedures in locating the Navy air field at New Iberia. They even had concrete being poured, it has been stated, before any approval was given by Air Coordinating Subcommittee for the construction of the airport! Looks like another case

(*Continued on page 55*)

Suite 344

The June Board of Directors Meeting was held at National Headquarters June 7. Those present, Joseph B. Burns, NBAA President, representing The Fuller Brush Company; Gerard J. Eger, NBAA Treasurer, representing International Harvester Co.; Henry W. Boggess, representing Sinclair Refining Company; James Ketner, Jr., representing Texas Eastern Transmission Corp.; Walter C. Pague, representing ARMCO Steel Corp.; Ralph E. Piper, representing Monsanto Chemical Co.; Robert C. Sprague, Jr., and guest, John Winant, representing Sprague Electric Co.; Curt G. Talbot, representing General Electric Co.

Bob Bergesen, Mgr., Air Transportation Dept., Ford Motor Co., has accepted a vacancy on the Board created by the change in by-laws of increasing the number of Board members from 9 to 11.

NBAA's Nominating Committee was appointed for the 10th Annual Meeting —Henry W. Boggess, Chairman, Ralph E. Piper and Joseph B. Burns, as committeemen.

On behalf of the membership and the Board of Directors, NBAA welcomes more new members. J. E. Greiner Co., Baltimore, Md., Civil Consulting Engineers, operating Aero Commander 520. Howland S. Davis, Chief Pilot, is NBAA Representative; Flight Safety, Inc., Flushing, New York, Professional Business Pilots' Training Organization, A. L. Ueltschi, President, is NBAA Representative; National Weather Forecast Corp., Newark, New Jersey, Private weather forecasting, H. R. Van Liew, President, is NBAA Representative; On Mark Engineering Co., Van Nuys, Calif., Manufacture, remanufacture and modification of executive aircraft, Robert O. Denny, President, is NBAA Representative and John Lee is Chief Pilot; United States Overseas Airlines, Inc., Wildwood, New Jersey, Supplementary Air Carrier, Conn Frank, Chief Pilot is NBAA Representative and Ralph Cox, Jr., Executive Vice President is in charge of aviation activities.

Federal Civil Defense Administration has invited NBAA to serve on a National Industry Advisory Panel in the event of a national emergency. The Board is of the opinion that NBAA should cooperate to the fullest extent in the civil defense program. Joseph B. Burns, NBAA President and your Executive Director as Alternate were appointed to represent NBAA on the National level with the other Board members representing on local and regional level.

Another Executive pilot in the NBAA family, Dick Groux, Jr., born to Dick and Rusty, Saturday, June 22. Congratulations on your new crew member. On behalf of the Board and the membership, may we express our appreciation for the many NBAA members attending the Air Traffic Control Advisory Subcommittee meetings being held within each CAA region. Each member organization is limited to two representatives at any meeting of the Subcommittees, one of which must be a member or alternate member. "Woody" Wood, Gillette Co., Bill Benedetti, Sprague Electric Co., also John Winant, Sprague Electric Co. as an observer, attended the first meeting of the Boston Air Traffic Control Advisory Subcommittee which was held on June 20. M. J. Smith, Dairypak, Inc. attended the first Cleveland Air Traffic Control Advisory Subcommittee Meeting held on June 5. Bob Kusse, Fruehauf Trailer Co. and Bob Hixson, Ford Motor Co., attended the first meeting of the Detroit Air Route Traffic Control Advisory Subcommittee held on May 9, and also Bob Kusse (Fruehauf) and T. P. VanSiever, Ford Motor Co., attended the second meeting of the Detroit Subcommittee held on June 13.

Mailings for the month of June—FCC's amendment authorizing the use of 122.8 and 123.0 mcs as "Special Service Frequencies" for use by executive and privately owned aircraft. (This was at the request of NBAA); 10th Annual Meeting Forum Exhibit brochure, exhibit form and housing form. (To NBAA members only). PNYA's special invite to the dedication of the International Arrival Building at New York International Airport.

Walt Pague, Chief Pilot, ARMCO Steel Corp., Middletown, Ohio, NBAA Board Member since 1947, NBAA's Vice President and Chairman of Forum Committee, also plays golf. He told us last month he shot a first hole in one—Walt, when are you going to release your secret on the ball with the built-in bird dog?

NOTE: It is time for your aviation fuel tax rebate.

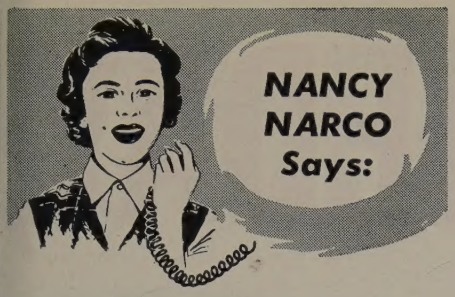
At the request of the House and Senate Interstate and Foreign Commerce Committees, your Executive Director testified on behalf of NBAA membership, urging Congress give favorable consideration to the Airways Modernization Board Bill and recommended its prompt approval.

He has also been busy with the Denver Arrangements Committee, Chairman "Corky" Douglass and Paul Bergren, Chairman Exhibits Committee, making final touches for the meeting. Its cool in Denver and hot in Washington.

Dick Groux is gradually getting used to the Washington Merry-go-round, attending Airspace and Airport Use Panel meetings and meetings on Systems of Navigational Aids.

A happy vacation to Joe Burns and family, Jerry Eger and Ralph Piper.

"C. M."



FRIEND OF MINE just got his instrument rating after pecking away at it for the past three years and does he feel superior! He can't understand why everyone doesn't go out and do the same thing.

GOOD IDEA, but how about that written work and the 40 hours of hood and Link time? This friend, who says IFR is the only way to go anymore, suggests "Just take the written, find out what you need to study, then go back and pass it." Probably a good idea, rather than putting it off like a dentist appointment.

OF COURSE, lots of us don't ever want a rating, but how silly it is not to get some instrument time so you don't panic if you get trapped. Lots of guys are flying around with full gyros, without being able to use them—even primitively.

INSTRUMENT PRACTICE is fascinating and simple. There are several good "blinders" which automatically convert your plane to an instrument trainer. Best, of course, to start out with good instruction, get the fundamentals and then try to make every cross-country flight under the hood. Any friend with a swivel-neck and a private ticket is legal as a check pilot.

YOU'LL SOON GET the instrument "bug," and it gives you complete confidence in radio as the basic navigation aid VFR as well as IFR. I've done some hood flying myself and I can tell you there's nothing so thrilling and self-satisfying as making a simulated instrument approach, counting off the minutes inbound from the low-cone, lifting the hood and seeing the runway a mile ahead, just where it ought to be.

YOU HEAR LOTS of preaching about being able to make a 180 degree turn on instruments or keeping the plane straight and level in cloud. Makes too much sense to argue about it. Case in point happened recently when a brand new businessman pilot departed Harrisburg for Washington, in minimum VFR weather. He got halfway, ran into unexpected lower scud, had no choice because of hilly terrain but climb to 3000' in the stuff. He'd had only some basic hood time, enough to control the airplane.

BEING TUNED into the Washington TVOR he took a heading for DCA, radioed his plight. No approach plates, no approach practice, but the kindly controllers gave him directions and pretty soon he was below it all headed for the runway at Washington National. Without at least the rudiments of instrument training, this story might have had a different ending.

HOW WOULD YOU DO in a situation like that?

Nancy

NARCO • Fort Washington, Pa.

ANNOUNCING THE NEW

narco VOA-3

A Precision Omninavigation System for Use with the

- **NARCO SAPPHIRE 1016**
- **NARCO SIMPLEXER**

Here's the Narco VOA-3—a completely new omninavigation instrument of extreme accuracy and reliability. It is designed specifically to add the Omni and ILS Localizer functions to the crystal-controlled VHF receiver section of the Narco Sapphire 1016, or the Narco 27-channel Simplexer, business aviation's most widely used VHF communications unit.

Designed to fit any standard instrument cut-out, the VOA-3 provides four-in-one presentation—"left-right", "to-from", selected course and reciprocal bearing. The VOA-3 is built to highest standards for dependable IFR use and has factory-certified accuracy of plus or minus 2 degrees.

The VOA-3 was made to order for aircraft already equipped with a basic omninavigation system and the 1016 or Simplexer for communications. By adding the compact, lightweight VOA-3 you gain the advantage of a second, highly accurate VOR/ILS Localizer system for added ease and safety in cross-country navigation.

TOTAL WEIGHT—FOUR POUNDS

VOA-3 indicator fits any standard 3⅛" instrument hole, is only 1¾" deep. Shock-mounted converter can be remotely installed, weighs 3.3 pounds. System is easily added to existing Sapphire 1016 or Simplexer units which have provisions for this installation.

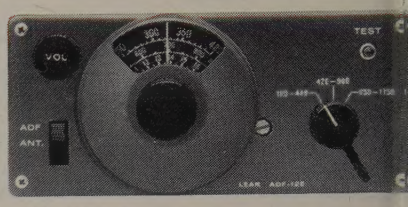
See your Narco dealer or write for full details

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

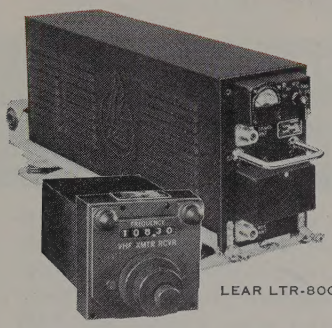
SOMEDAY,

NEWEST VERSION of the automatic direction finder used in more planes (10,000,000 hours of flying time!) than all competitive units combined. LEAR ADF-12E is easiest to operate; lightest in weight; by far the lowest-priced. Can furnish power and modulation for a LEAR RT-10 VHF transmitter.

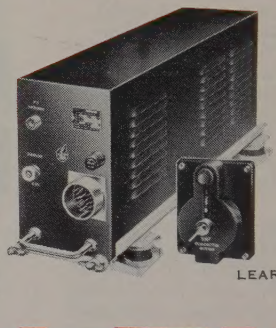


LEAR ADF-12E

MAY EQUAL THESE


LEAR LTR-800

FIRST AND ONLY 800-channel VHF transceiver. LEAR LTR-800 weighs only 26 pounds; occupies only a ½ ATR package; costs no more than sets offering a fraction as many frequencies. Provision for VOR, VAR, and ILS localizer. Your airplane will be obsolete before this will.


LEAR LVTR-36

THE INDUSTRY'S STAND transceiver for medium size business aircraft. LEAR LVTR-36 include automatic channel selec Clear, sharp transmissio and reception on 36 cha

BY THEN

HEADING, BANK ANGLE, AND PITCH all presented *naturally* on a single dial. LEAR NAFLI (NAtural FLight Instrument) system offers magnetic slaving and latitude compensations, virtually combining the LC-1 Compass with the most readable attitude indicator made.

LEAR NAFLI

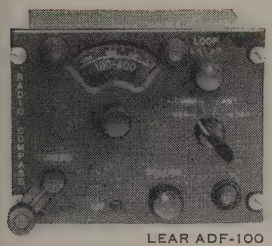
LATEST MODEL of the light-weight communication and navigation package which has become practically standard equipment on light aircraft. LEAR LTRA-6T system includes VHF receiver with "Tone Tuning" and OmniMeter®; LF receiver; 12-channel VHF transmitter; marker beacon receiver.


LEAR LTRA-6T

MAKE STILL

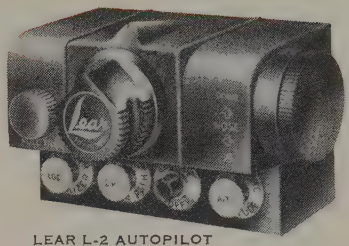
For full information see

SOMEONE



LEAR ADF-100

THE WORLD'S MOST ADVANCED ADF is the only *fully-transistorized* navigation system. LEAR ADF-100 is the lightest, most compact airline-calibre direction finder; uses only one-tenth the power other ADF's require.



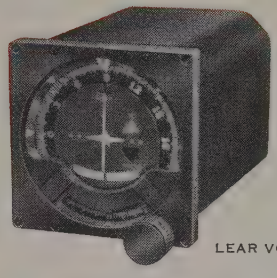
LEAR L-2 AUTOPILOT

THE PRIVATE FLIER'S ONLY full-fledged three-axis flight-control system. LEAR L-2 Autopilot offers automatic ILS and automatic altitude control. The only thoroughly proven automatic pilot for all light and medium planes.

INSTRUMENTS...

LEAR L-5 AUTOPILOT

BY FAR THE LIGHTEST AUTOPILOT system for larger high-performance aircraft (weighs 60 to 90 pounds less than others). LEAR L-5 Autopilot System also costs less, yet includes (all automatic) trim, safety cut-out, altitude control, ILS.

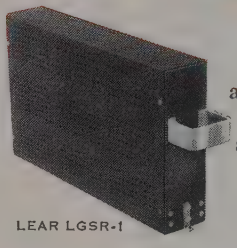


LEAR VORTRAN

THE ONLY OMNIRANGE INDICATOR with built-in omni converter, fully transistorized. LEAR VORTRAN adapts to any VHF receiver covering omni frequencies. Just tune to the desired station, adjust the course selector, and fly the needle!

LEAR WILL

LIGHTEST GLIDE SLOPE RECEIVER on the market (five pounds). LEAR LGSR-1 features built-in transistorized high-voltage power supply; has full 20-channel coverage; provides power for autopilot ILS system and dual ILS indicators; fits a short ¼ ATR package; meets ARINC requirements.



LEAR LGSR-1

FINEST GYRO-STABILIZED latitude-compensating compass available. LEAR LC-1 is reliable and accurate even in high latitudes and magnetic storms. Navy's choice (designated Type MA-1) over all similar directional systems.

LEAR LC-1 COMPASS

BETTER ONES!

r distributor or write LEAR, *Incorporated,* LEARCAL *Division, 3171 South Bundy Drive, Santa Monica, California.*

LC-43

AIR YOUR VIEWS

Dear Editor:

In the "General News" section of your June 1957 edition is an article in which it states that the CAA and Link Foundation are on a cooperative venture, bent towards introducing a new type of pilot training course. The method of instruction suggested is to teach students to fly and maneuver by reference to instruments.

This approach is quite sound, and practicable. I have about 4000 hours as an instructor and have for a long time now been using a modified visual-instrument method of instruction. Unfortunately, too many instructors are adhering to the same civilian methods of instruction which have been in existence for a great many years. The new crops of instructors continuously being turned—or should I say "churned" —out, are teaching their students through mimicry. No fault of their own—this is the way they were taught and this is the way they teach. As a result, the sky is getting clustered with an abundance of unproficient pilots.

In evaluating what was happening, I decided to put to work a combination method of instruction which, at the very worst, could certainly be anything but detrimental to my students. As a result, I have noticed that my students' proficiencies have increased so that at solo time their airwork would pass a private pilot flight test. Also, instead of needing 10-15 hours of take-offs and landings prior to initial solo—as is so often the case—my students average about 4 hours of pattern work before soloing (this includes X-wind take-offs and landings and bad bounce recoveries). The last student I soloed, two days ago, did so in a 15-20 knot X-wind—and after only 2 hours and 40 minutes of touch-and-gos.

I must admit, however, that my switch-over in instructional methods was not prompted by any desire to keep a student out of difficulty were he to unexpectedly run into marginal flight weather conditions. In this respect I still adhere to my age-old method of instruction and advice —"Stay the hell out of it" . . .

Sincerely,
SAFAIR FLYING SERVICE, INC.
H. M. C. "Tommy" Walker

[With reference to Skyways article, April issue, "High Density Rules Formalized."]

Dear Mrs. Henry:

Congratulations for your suggestion re "—flip your VHF receiver—and listen to —Center working the lads on IFR flight plans." It is not very often the ATC gang (towers and centers) receive praise such as expressed by "Nancy," on page 15 of the May 1957 issue of SKYWAYS. As you no doubt know, anyone in the job of serving the public, and more especially anyone having something to do with regulating traffic, be it road, rail or air is always a ready target for the needle. It does one's heart good to read some words of praise instead of criticism—the easiest thing in the world to dish out.

We've been in the business of "keepin' 'em apart" for a little over 20 years and in that time ATC has been the brunt of many caustic comments. Maintaining the business on a shoestring budget was also a load to be borne but, once a guy gets the ATC bug in his blood, he seems impervious to the heckler and patient with the uncomprehending. Most every comment in the uncomplimentary line came from those who were not fully familiar with the controller's job. Your suggestions, re tuning in to the Center frequency as well as visiting the towers, should go a long way in having some of the ATC problems, etc., brush off on listener-inners and looker-onners.

You have a swell magazine and carry a lot of good general information for the benefit of your pilot members. Their cognizance of ATC problems is one sure way of their avoiding known pitfalls and, in the end, pilots will get much better service from our control facilities.

Again congrats and 73's—
From an ex Strip Watcher

[Ed. Note: "Nancy" is Nancy Narco.]

now hear this...

Charles Moxley has been appointed to the newly created position of staff council at Flight Refueling Inc., Baltimore, Md.; **James Cannon, Jr.,** was promoted to the position of contracts administrator. **Robert C. Smith** has joined Temco Aircraft Corp. as price re-determination administrator.

Maurice Keating, Jr. has been promoted to chief pilot for Pacific Northern Airlines. Keating has been flying with the Alaskan carrier for 11 years.

Wiley R. Wright, long-time CAA official, has been named Ass't. to the President of Northeast Airlines.

Col. W. T. Ensley, USAF plant rep. at Boeing Airplane Co., Seattle, since Dec. 1954, will end his tour of duty this week. **Col. R. J. Walling,** USAF Office of Procurement Production, succeeds him.

Lowell Lawrence, former flying school operator, has joined AiResearch Aviation Service as Ass't to **Charley Know,** contract administration head.

Edwin R. Castle has been appointed Manager of Garrett Supply, Phoenix, Ariz.

Brig. Gen. Clarence E. Shoop, commander of Air National Guard's 146th Fighter-Interceptor Wing at Van Nuys, Calif., will turn over his command to **Brig. Gen. Marvin G. Sturgeon.** Shoop is vice-president of Flight Operations for Hughes Aircraft; Sturgeon is director for Public Works for Ventura County in civilian life.

William F. Tyson has been named Gen. Sales Manager of Van Dusen Aircraft Supplies, a new company-wide position.

Robert L. Robertson has been named Staff Ass't. of Howard Aero Service, Inc., San Antonio, Tex.

Robert M. Kearns, former engineering and methods manager of Alloy Tube Div. of Carpenter Steel Co., Union, N. J., has been named manager of the Div.'s engineering and planning dept., a new dept.

John M. Welch has joined Olin Mathieson Chem. Corp. as Chicago regional sales mgr. for Olin Aluminum. He had been dist. sales mgr. for Kaiser Alum. & Chem. Corp., Chicago.

R. K. Hoffman, mgr. of Engineered Products Div. of Acme Precision Products, Inc., Dayton, has been named a vice president. Company makes tools, dies, jigs, fixtures, patterns, automated and special machinery.

John W. Deck, formerly Eastern Dist. sales rep. for Neilson Chemical Co., has joined Synthane Corp., Oaks, Penna., mfrs. and fabricators of laminated plastics. He will assist Detroit Synthane's sales office mgr. W. H. Borden.

W. W. Fox, senior project engineer for Convair's F-102A Delta Dagger for the past 3 yrs. was appointed special ass't on F-102 F-106 by B. F. Coggan, v-p and San Diego mgr. of Convair, a Div. of Gen. Dynamics Corp.

Col. Albert A. Arnhym, Dir. of Info. Services of Air Research & Dev. Command, has been made Special Ass't to Commander-in-Chief, SAC, Offutt Air Force Base, Neb. New Dir. of Info. Serv. for ARDC is **Lt. Col. Carlo R. Tosti,** former ARDC Asst. Exec. Officer. **Major Kenneth E. Grine** is new Chief of OIS Pub. Info. Div. which is responsible for liaison between all pub. and industrial news media and ARDC.

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

READING AVIATION'S ANNUAL MAINTENANCE AND OPERATIONS MEETING

(Condensed in this issue and substituted for the regular Round Table.)

In the July issue of Skyways we reported briefly on the Reading Show. Following are the highlights of the talks given there.

"Sime" Bertolet, R.A.S. President, welcomed the gathering, and Jerome Lederer, Director of F.S.F., acted as Chairman.

Jerry Lederer, Flight Safety Foundation Director, discussed what he considers to be three outstanding safety problems:

". . . 1. mid-air collision prevention, 2. preventing private pilots from killing themselves on X-country flights by being caught inadvertently in instrument weather, and 3. crash survival—the ability to walk away from a cracked-up airplane.

". . . until there is a real plan for midair collision prevention, you'd better *listen* with your ears and find out where the other traffic is.

"As an aid to the 'be seen' part of the 'See-and-be-seen' principle, there is available now a new type fluorescent paint to make an airplane more visible. This paint is being used by the military services with great effectiveness, as evidenced by the following report from the office of the Inspector General, Hqs. Flying Training, USAF, Waco, Texas: "In one test a T-33 jet trainer with only the external tip tanks painted blaze orange was flown around the local area at one of our bases at a time when the pilot could not visually locate another aircraft in the sky. He made a call on his radio asking anyone who saw his aircraft to give him a call. He immediately received six or eight replies. These aircraft reported their relative position to him. However, he still could not see them!

"On another occasion a pilot flying at 44,000 feet altitude called one of our towers and reported something red on the ramp. He could not see the airplane but he *could see* the color and he asked what it was."

". . . To make the 'see and be seen' concept more workable it would be highly desirable to secure this paint and put it on your airplane; not the entire airplane but probably the wing and rudder tips, and perhaps the nose.

". . . On this matter of X-country flying: The most frequent cause of fatal accidents in private flying is inadvertently flying into instrument weather with the pilots killing themselves and their families. Since flying into instrument weather is inevitable in modern aircraft, the solution is to learn to fly on instruments, or at least to have the ability to control the airplane in banks and pitch by reference to instruments alone before you carry passengers.

". . . The University of Illinois has conducted experiments to teach instrument flying and contact flying simultaneously in the same number of hours and their students have indicated that they have much more respect for weather knowing something about the problems of flying in weather than they had before—more than the average student who flies only contact.

". . . In connection with crash survival, a lot is being done by all manufacturers on this. Last year when I spoke about the use of shoulder harnesses, and hard hats, etc., quite a few people came up to me and asked where they could get hard hats. Those are now available at Air Associates. They cost $8, weigh 12 ounces, and they're very good for protecting your head in a survivable type of crash, when you might otherwise be killed."

Bob Buck, Captain Trans World Airlines, paralleled business flying's progress with that of the airline industries:

". . . I've been in the airline business for 20 years and in looking back on all the mistakes we've made, I feel there's a parallel between airline flying and private and business flying. Both private and business flying are going through certain things that we went through. More and more equipment is going into these aircraft—more and more instruments."

"We in the airlines rapidly discovered we had to have two of everything. This is a need I have also noticed in the smaller aircraft that I fly and get on-instruments in occasionally. In private aviation, there is still a lack of the 'double standard' concept."

"The airlines went into a multiplicity of doubling up so that the radio equipment so vital to navigation and communication under instrument conditions isn't going to go out. While you may have two of a lot of things, you only have *one* little wire feeding the juice.

". . . Anyone who flies a lot will agree with me, you need plenty of carburetor icing control. There's nothing more dreary than to be out of engines when you're on instruments."

Beyond having the equipment to take care of carburetor icing, you also have to know how to use it. If you put on heat when it's too cold you may raise the temperature enough *to make* the carburetor ice!"

". . . The subject of using a checklist is a pet of mine! I think if I were

HUNDREDS *of corporate, business and private aircraft were flown to the Forum, many to compete for the Reading Awards.*

AIRVIEW *of RAS, Forum day shows planes of participants and enthusiasts. One hangar housed maint.-safety display booths.*

ONE OF READING *Aviation's buildings served as a dining-hall. Crowds lunched lavishly; gourmet-touch was turtle-soup.*

flying a Jenny with a throttle and "tach" and a fuel shutoff, I'd still have a checklist in it. I think the checklist started off as an insult to pilots, and that's why it didn't get universal acceptance. There was a great holding back among our own pilots to use this thing, but we finally cured it, so much so, that we go the other way. We change checklists periodically so that you can't always memorize them. In the middle of the night or when you're very busy with A.T.C., as well as you know that list, you'll see an item and say 'did I really check that' and you'll go back and look at it!"

Randy Carpenter of Flight Safety Foundation urged business pilots to establish proficiency standards.

"Jerry Lederer, in opening the program, used the phrase 'listen with your ears.' One of the things that I most frequently notice in the high-density areas as well as the outlying stations is a tendency for many airline and military pilots, not to wait upon changing to a new frequency to see what has transpired in the last thirty or fifty seconds, but to announce their position and frequently request long and detailed weather information.

"Apart from busting up transmissions to or from other aircraft already on the frequency, they request unnecessary repetition of information just transmitted.

"A recent critical situation concerns the numerous and, in my judgment, unnecessary number of restricted and prohibited areas that exist in the United States. The fact remains however, that many pilots are apparently unaware of the seriousness attached to the inadvertent use of these areas.

"In the far west, an aircraft flew into a critical area in which a drone was being operated as a target for an aircraft-seeking missile. The critical distance that was achieved was on the order of two thousand feet; that is, had the interloping airplane gone 2,000 feet further the missile would have sought the private *Cessna* instead of the *drone*.

"In the use of light airplanes and with particular reference to the light twins, I suggest to you that you study the minimum single-engine control speeds that are involved, that you study V1 and V2 and have an idea what refusal speeds are in aircraft like the Piper Apache, the Cessna 310, etc. These speeds are not necessarily computed as a legal requirement. They are nevertheless speeds that you can determine through either the manufacturer or yourself and they may save your life someday.

"In view of the complexity of the airways system and the requirements implicit in the Curtis report, I suggest that instrument flying will be a requirement to fly into high-density areas in the coming years. A proper goal for any personal or business pilot should be the acquisition of an instrument rating."

Joe Chase, Flight Safety Foundation, spoke of the value of manualizing maintenance.

". . . I suppose every mechanic hopes to talk someday to a group of pilots about aircraft maintenance. There's an awful lot to be said on the subject.

"Three aspects of aviation maintenance that deserve attention are: The necessity to manualize maintenance procedures, Murphy's law and what you can do to annul it, and the problem of bogus parts.

"Maintenance has become a business of specialists. It not only behooves you to utilize the service of those specialists but you must specialize the management of your maintenance. In short, a safe flight operation can be built only upon a completely manualized maintenance procedure. If you are not fully conversant with what it takes to keep your airplane in the best condition, and have not yet established a written procedure schedule that removes all the guesswork, then I urge you to sit down with the top man of a reputable maintenance operation and work out such a procedure, step by step. Don't turn the job over to your co-pilot or your mechanic; it is important enough for your personal attention.

"I see an endless stream of maintenance alerts, inspection aids, and reports of mechanical difficulties experienced on business aircraft. They indicate not so much the poor workmanship as the failure to inspect at the right time and the right place.

"The airlines have remarkably few instances because every step of their maintenance is spelled out for every man involved, nothing is left to memory, nothing is left to chance.

"Most airlines and business fleet operators have gone to progressive maintenance. They find it is the cheapest; it permits the best distribution of work load and it assures the most utilization of the airplane. If progressive maintenance fits your operation, try it. If not, stick to the old Number One, Number Two and Number Three checks, but get it manualized. Trouble-free flying will be your reward.

"Murphy's law, in case you have forgotten, states one of the basic facts of aviation: If an aircraft part can be installed incorrectly, somebody will install it that way.

"Murphy's law has three aspects: (1) It reflects the ingenuity of the engineer who is capable of designing a component that could be installed in more than one way. (2) It taxes the patience of a mechanic by requiring him to make another damned decision. (3) It works against the pilot's chances of collecting his old-age benefits.

"Rather than ask you to imagine Murphy's law in operation, I will cite a couple of uncomplicated cases. During the major overhaul of a DC-3, a mechanic *reversed* the position of two pulleys in the aileron control system, an aluminum and a micarta pulley. Control cables passed over each of these pulleys and the ends of these cables passed to the end of a bicycle chain which runs over a sprocket that is attached to the control wheel. After switching the pulleys, the mechanic proceeded correctly and he fastened the cable passing over the micarta pulley to the upper end of the bicycle chain and the one passing over the aluminum pulley to the lower end of the bicycle chain.

"One member of the test crew was killed and two others were seriously injured when the plane crashed immediately after take-off.

"On another airplane, the pilot felt the airplane skid and settle after the nose wheel came off the ground during the take-off run. He pulled the airplane into the air and checked the landing gear switch. It was in the Down position and he felt that the gear was coming up. He put the switch in the Up position. He checked the gear manually and found it was down and he made a safe landing. A review of the maintenance records showed that the retraction test had been run with the gear switch removed from its receptacle; afterward the switch was installed backwards.

"Unfortunately, these are not isolated cases. A four-engined aircraft could not be trimmed properly because the aileron centering spring had been installed 180° off. In another case it took the combined strength of the pilot and co-pilot, plus full aileron trim to keep the airplane straight; the cover on the filter assembly on the aileron power control unit had been installed upside down. This mashed the screen and restricted the pressure and the flow to the power control unit. So what can *you* do to annul Murphy's law? You can check your controls before flight,

(*Continued on page 38*)

Certain Contraindications to Flight

By Russell J. Vastine, Jr., M. D.
Aviation Medicine

The increasing use of executive aircraft has brought about a mounting number of exposures of persons with non-confining illnesses to the effects of altitude. While the altitudes attained by business aircraft are of no great concern to the so-called normal, or healthy individual, they can be potentially dangerous to persons suffering from certain diseases.

Let it be understood that to me there is no other way to travel than by air. My main purpose is to help keep aviation from losing public respect by doing harm to those who fly. There are very few medical contraindications to flying, but the rule of thumb that if they can walk to the airplane, they can fly, is not valid.

Oxygen makes up about 29% of the atmosphere at all altitudes, therefore it exerts 29% of the atmospheric pressure at any given altitude. This pressure is referred to as the Partial Pressure of oxygen. We know that for our bodies to function properly we must have oxygen available at a definite partial pressure. Any lowering of that pressure, as with increase in altitude, places an added work load on our lungs, heart, and circulatory system. The normal individual is capable, because of body reserve, to compensate for this reduction in oxygen partial pressure to altitudes approximating 10,000 feet. There are signs of oxygen want at lower altitudes, such as deterioration of night vision at 5000 feet or above; but for all practical purposes healthy persons can function well at altitudes of 8000 to 10,000 feet.

People who have diseases of the respiratory or cardio-vascular systems already are using much of their reserve in order to maintain themselves at ground level. Any increase in altitude, with its corresponding decrease in oxygen partial pressure may place stresses upon that individual that he may not be able to compensate for. Thus, the person with heart disease may be pushed into a state of heart failure. The person with coronary artery disease or Angina Pectoris may be deprived of enough oxygen to cause coronary occlusion (heart attack) with resulting protracted loss of work or even death. The person with respiratory disease may have respiratory failure because of this loss of available oxygen.

There are people who suffer from diseases characterized by spaces filled with air; so as altitude increases and atmospheric pressure decreases, the air in these spaces expands. This can have disastrous effects upon this person by further impairing an already impaired respiratory system, by increasing the distention of an already distended loop of bowel, by strangulating an unsupported rupture, or by rupturing a space that had theretofore limited the spread of a serious disease, such as tuberculosis.

There are other diseases that are subject to periods of sudden incapacitation that may cause extra work and concern for a pilot who is busy enough executing a safe flight. One of these is epilepsy, an attack of which may be precipitated by oxygen want. Another is diabetes, where there is always the possibility of sudden insulin reaction, or sudden diabetic coma. Pregnant women near delivery date may suddenly begin labor, or a pregnant woman who habitually miscarries may do so during a flight.

People suffering from anemia for one reason or another may be able to get the oxygen they need into their lungs, but do not have the red blood cells and hemoglobin available to transport it to the tissues where it is to be used. Reduce the amount of oxygen available to them by increase in altitude, and you may seriously jeopardize their health.

Other conditions that will not worsen by increasing altitude but that may be unpleasant to other passengers should also be considered in evaluating passengers for flight. Persons who do not have control of their bodily functions, or persons who are psychotic, or potentially so, should not travel by air. Good medical consultation, preferably by a doctor who has some knowledge of the problems involved in flying is invaluable in enhancing the efficiency of aircraft used in industry. In summary, to guide in screening frequent users of executive aircraft, the following people should not fly:

1. Pregnant women beyond the eighth month.
2. Pregnant women who habitually miscarry or who have a history of premature labors.
3. Infants under seven days of age.
4. People with congenital heart disease who cannot tolerate one flight of stairs.
5. People who are anemic, with a hemoglobin of 60% or less; also persons with sickle-cell anemia.
6. Diabetics who are easily subject to insulin reaction or coma.
7. People with any active pulmonary disease, cavitation, or acute upper re-

(*Continued on page 29*)

DR. VASTINE *holds a valid commercial certificate and flies his own Tri-Pacer. He is chairman of the Scientific Committee of the Flying Physicians Association. A designated medical examiner for CAA, Doctor Vastine specializes in Aviation Medicine for the corporate pilot and industry at his airport office in Niles, Michigan.*

Search For Human Causes of Aircraft Accidents

By Anchard F. Zeller, Ph.D.

Chief, Human Factor Branch
Aero Medical Safety Div.
Directorate of Flight Safety Research

At the Aircraft Industry Conference held at Santa Barbara, Calif., in May, Dr. Anchard F. Zeller presented his report, "Search for Human Causes of Aircraft Accidents." Skyways selects timely sections from this report for your reading interest.

The prevention of loss of men and equipment is of critical importance both to military and civilian agencies. When considering aircraft accidents, past Air Force experiences indicate that human considerations outweigh others as causes by a ratio of almost two to one. The search for human causes and related factors must be pursued vigorously if accident causes are to be determined and preventive measures initiated. The human element is the critical factor in the majority of accidents and it is through a clear understanding of the human cause factors that the greatest number of accidents can be potentially prevented.

The Prevention Concept

Direct investigation of actual accidents is one of the best methods of arriving at a factual evaluation of the various human facets which are important for accident prevention. Investigation is a first step in the over-all prevention program; it supplies the original basic data. When evaluated, the data leads to corrective action. The effectiveness of this action is then measured by an evaluation of future accidents.

Multiple Human Involvement

Relations of human variables to accidents are not apparent from a single accident but become important through the observation of *many* accidents and careful analysis of the recorded observations. The search for human factors, then must be for more than the obvious.

Important human variables, once identified, can be evaluated; control measures can be developed. These measures may be directly related to the human through selection, training and operation assignment; or indirectly related when concerned with hardware modifications aimed at simplifying the human's task or improving the tools with which he must do this task.

In searching for human contributions to accidents, many persons must be considered: 1) the pilot, who often precipitates the accident, primarily because as operator he is in a position to commit the maximum number of errors which can lead to an accident; 2) the aircrew, who are also in important positions as far as successful operation goes; 3) tech-order writers and 4) commanders and supervisors who can define a position *beyond* the capability of the man and machine in the man-machine complex, and thus predetermine an accident which in the final analysis may be charged either to the pilot or materiel failure; 5) maintenance and/or service man who can preset the situation so that an accident becomes inevitable in spite of maximum corrective efforts of the operator or crew; 6) the weatherman, whom the pilot must depend on for information of possible hazards; and 7) other support personnel such as tower operators, GCA operators, mobile control operators, or any group of individuals whose responsibility is to give information to the pilot upon which he must base critical decisions.

"Background" groups must also be taken into consideration: 1) many accidents charged either to materiel failure, maintenance failure, maintenance error or operator error should realistically be directly credited to the designer who through ignorance or inadequate attention to the limitations of the humans who must service, maintain and operate the equipment, has *structured* a situation which will ultimately result in failure and accident; 2) training personnel, whether the training is for pilots, for supervision, for maintenance men, or for support personnel, may omit or give inadequate attention to details in the training process, which may result in either lack of knowledge or faulty information. A critical situation will show this, and it will mean the difference between a successful recovery and an accident with destruction and fatality. *Any* accident is the result of multiple considerations. It must be determined *who* was responsible for the failure, *how* it occurred, and *why*. The analysis of all this information will lead to positive meaningful correction.

The Man-Machine Concept

What information must be obtained and what systematic approach can be developed to guarantee that there is a minimum chance of neglecting critical areas? An approach to a realistic answer to this problem is to consider the role of the man in the flying situation. A man, a machine and an environment are always involved. The man may be anyone from a design engineer to a pilot; the machine may be a simple protractor or a complicated high performance aircraft; and the environment may be a pleasant, comfortable well-lighted office or the cockpit of an aircraft at altitudes flying several times the speed of sound in a physical environment which is not conducive to the completion of successful flight. The whole system of man-machine-environment must be considered to get a true understanding of the role of the human in accidents.

Action Resulting from Information and Decision

Every human action is the result of three considerations: 1) available information on which to base various types of actions; 2) a decision to be made as to the specific action to be taken; and 3) action taken which puts the decision into effect. Information is based on background training and experience as well as immediate perceptions; decision for action may be relatively simple where a specific directive is concerned, (e.g., a work order to a maintenance man to do a specific task) or it may be highly complex and subject to many variations as in the case of the pilot who is required to make a dead-stick landing in a high performance aircraft where difficult distance rate-of-closure judgments and precision manipulations are required; and action may vary from the simple to the exceedingly complex.

Human Limitations

While the human is an integrated functioning organism which cannot arbitrarily be dissected into various functions, he may be considered as a limited physical, physiological, and biochemical structure—a psychological being with limiting characteristics in terms of abilities to learn, retain, and act, a being subject to fears and emotions which affect his over-all behavior. To evaluate his role critically the information-decision-action cycle must be examined for elements which may have exceeded the limitations of, or resulted in complication in this physical, physiological human.

The Pilot—Information

Sources of information for a particular flight include: 1) Background experience and training which make the flight possible; 2) the immediate past contains decisions and actions which act as a feedback circuit, supplying information which requires that the flight be made; and 3) the immediate pre-flight information involves facts about the aircraft, the weather, the facilities available during and at the termination of the flight, as well as other miscellaneous pieces of information which

(*Continued on page 36*)

PLANE FAX

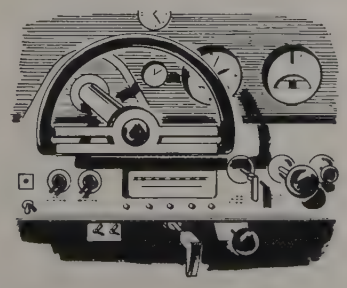
by STANDARD OIL COMPANY OF CALIFORNIA

Planting trout by air into Cascade lakes

"Bombing" mountain lakes with fingerling trout, Sam Whitney has revolutionized Oregon's fish-stocking program. In just one month he "plants" more than 350 lakes by flying 150 feet above the water — high enough for the fish to lose their forward motion before they hit. Pack trains previously spent all summer stocking only 60 lakes.

"Dropping toward those small lakes in timber country can be a lot of fun," says Mr. Whitney, "as long as I know I have enough power to get up and out again. That's why I use Chevron Aviation Gasoline — it *always* gives me the extra power I need, without a miss. It never fouls my plugs, either. There's no better gas made.

"I know RPM Aviation Oil is the best 'engine insurance' I can get. It keeps my planes running smooth and free for hundreds of extra hours, with never a stuck valve or ring. In fact, when a customer comes to my base at Newberg, Oregon, with that trouble, I usually cure it just by flushing out his engine with 'RPM'."



TIP OF THE MONTH

It's smart to check all controls every time someone changes seats — it's easy to bump a vital switch or lever.

We take better care of your plane

CHEVRON AVIATION GASOLINE

AVIATION OILS RPM

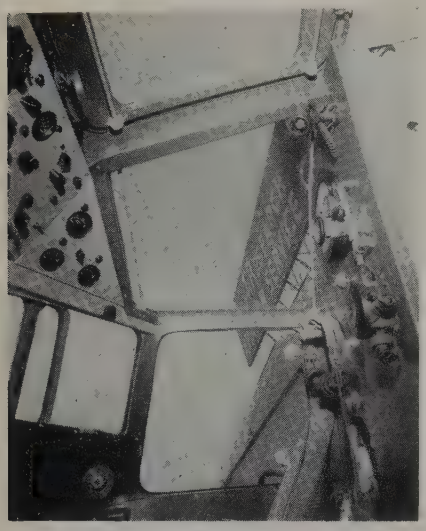
T.M.'S "RPM," "CHEVRON," "PLANE FAX," REG. U. S. PAT. OFF.

SAFETY EXCHANGE

Executive DC-3 Leads Way To Maximum Flight Visibility

The "Green Hornet," the Garrett Corporation's DC-3, is now flying its daily Los Angeles-Phoenix schedule with what is believed to be the greatest visibility of any airliner in the world, due to a revolutionary innovation in the craft's construction.

Garrett's Aviation Service Division, one of the country's largest service and



modification centers for business aircraft of all types, engineered and installed an extra 1200 square inches of glass above the pilots' compartment. This allows the pilot and co-pilot 150% more visibility, and enables them to see a much larger area of the sky around them than was possible before. This unique roof-window modification was suggested originally by The Garrett Corporation's pilots, Jack Womack and Paul Hettinger, so that they would have far greater visibility, and therefore added safety.

The new overhead section consists of three separate panels of lucite, approximately 400 square inches each. The two panels on either side of the fuselage are curved to fit the plane's contour. The center panel, which is nearly flat, doubles as an escape hatch.

Know Your Thunderstorms

A brief refresher on thunderstorm characteristics is always in order at this time of the year. The following pointers from Flight Safety, Inc., executive refresher training school at La-Guardia Field, N.Y., will be of interest to all executive pilots and particularly to those whose airplanes are not equipped with radar.

1. Each thunderstorm has several separate cells of up and down drafts with accompanying severe turbulence.
2. Up drafts and associated gusts are considerably stronger than down drafts. Estimated maximum values are ± 4000′/min. and ± 6000′ up.
3. Greatest turbulence at all levels is associated with highest water concentrations.
4. Maximum turbulence usually occurs between 12,000 and 20,000 feet.
5. Minimum turbulence occurs beneath storms. (Rule of thumb: ⅓ distance from surface to cloud base.)
6. Down drafts at low levels are rarely hazardous except over hilly terrain. Strongest down drafts are within the rain core.
7. Thunderstorms will often have hail with extremely strong up drafts. Maximum hail occurrence is at 10,000′ to 15,000′ and hail may be thrown into clear sky from sides of cell or from cloud overhang.
8. Cloud to ground lightning indicates a "mature" storm. Cloud to cloud lightning indicates a dissipating (anvil stage) storm.
9. At the freezing level in thunderstorms, the airplane has the greatest exposure to lightning strikes.
10. The roll cloud (caused by shear between up and down drafts) is less hazardous than the area in the cells of the storm. About 20% of thunderstorms have a developed roll cloud.
11. The rain preceding the cell has a strong wind shift and is therefore of maximum danger to landing and taking-off aircraft.

Flight Instruments and Electrical Power Failure Warning

A recent investigation of an air transport accident involving a "sudden and surprising" crash landing almost immediately after takeoff disclosed inadequacies in the present-day electrical power failure warning system, particularly as it affects flight instruments. While actual in-flight instrument failures are not commonplace, they have happened and have been attested to by highly qualified and experienced pilots.

For example, while on an ILS approach, the captain of a twin-engine transport reported his horizon slowly indicated a bank. The first officer, who was flying the plane from the left seat, tried to keep the plane in relation to what the horizon was telling him. The horizon on the right side, however, was indicating just the reverse, so the captain corrected the maneuver. Investigation subsequently showed that the horizon on the left side had failed with no warning light indication. The trouble was found to be in the Phase C circuit —the 115V Phase C circuit breaker had popped out!

This incident proves a point that may not be well known to anyone except electronic specialists, namely, that the inverter failure warning lights may *not* give warning where there is loss of *only one* phase of AC power!

Until answers are found to the question of reliable performance of electrical flight instruments, adequate warning of power or instrument failure, etc., it would appear that an alternate means of flight instrumentation is desirable.

For example, an air-driven flight group or non-electrically operated gyro instruments for primary use rather than utilizing *only* electrically driven instruments.

Excerpts from:—Flight Safety Foundation, Pilots Safety Exchange Bulletin

[Ed. Note:—Re: the subject Riker's Island (LaGuardia Field) DC-6 crash, the line of questioning taken at the CAB hearing indicated a strong possibility that one or more of the inverters may have been *off*. This possible contributory cause, like the general public impression in favor of a weather factor (icing), still offers little explanation for the lack of detection by the flight crew of the tremendous inertial loads imposed by the extraordinary change of direction!]

Another line of inquiry of much interest is the setting and operation of the control trim tabs of the subject ill-fated flight. Investigating agencies and airline personnel have been trying to duplicate (to explain) the extraordinary flight path by use of actual aircraft and radar comparison.

SCATER Plan Announced by CAA

Washington—Procedures to be followed by civil and military Government aviation agencies, and *users of the airspace* in the event of an air defense emergency, have been announced by William B. Davis, Acting Administrator of Civil Aeronautics, U.S. Department of Commerce.

Known as SCATER (Plan for the Security Control of Air Traffic and Electromagnetic Radiations During an Air Defense Emergency), it was prepared jointly by the Civil Aeronautics Administration, United States Air Force, Civil Aeronautics Board and Department of the Navy, and was coordinated with interested civil aviation organizations.

It is based on a plan approved in 1952, but has been enlarged to include rules for the security control of air traffic, which will become effective immediately upon the declaration of an air defense emergency.

The Plan sets forth, in detail, the functions of the CAA and various military organizations during periods of emergency as declared by the Commander in Chief of the Continental Air Defense Command (CONAD). It applies to all areas of the United States but may be modified in overseas locations depending on the requirements of Commanders of Overseas Commands.

The purpose of the SCATER Plan is to "establish responsibilities, procedures and general instructions for the security control of civil and nontactical military air traffic, air navigation radio

aids and aeronautical communications during an air defense emergency which will provide maximum utilization of aircraft by military and civil agencies engaged in essential operations."

Under the provision of the Plan, the Administrator of Civil Aeronautics will prepare regulations necessary to implement SCATER, will coordinate the procedures with CONAD, administer SCATER according to the requirements established by CONAD and advise civil aviation interests of the requirements of the Plan.

The CAA Regional Administrators will work with CONAD Division Commanders on procedures for implementing and testing SCATER, disseminate instructions to civil and military aeronautical facilities and maintain liaison with CONAD at the Division level.

Copies of the SCATER Plan may be obtained free of charge from the Civil Aeronautics Administration, Press and Publications Staff, Washington 25, D.C., or from CAA Regional Offices in New York, Kansas City, Fort Worth, Los Angeles, Anchorage, and Honolulu. [Ed. Note: See NEDA article, SKYWAYS, July 1957 issue.]

Lear Charges CAA with Failure to Tighten Minimum Licensing for Pilots

Bill Lear, board chairman of Lear, Inc., Santa Monica, let a blast fly at the CAA for its persistent failure to tighten the minimum licensing requirements for pilots.

He was chairman of a panel discussing business aircraft last month during the concluding sessions of the summer meeting of the Institute of Aeronautical Sciences' summer meeting in Los Angeles.

In attendance were 2000 scientists and engineers.

According to Lear the CAA was indirectly responsible for the series of San Fernando Valley fatalities which culminated in a recent accident which took four lives when a private plane plunged into a house.

Lear lashed at the CAA, "The CAA has really evaded their true responsibility to protect the flying public by not insisting on some modified form of instrument capability before permitting a man to take passengers on a cross-country flight."

Lear told the panel that no more than five hours' added instruction per pilot in instrument flying would be necessary to insure against a continuation of small plane crashes such as the disaster when Joel Thorne's lightplane crashed into a Hollywood building in October, 1955, killing 55 persons.

If the CAA continues to ignore its responsibility of bringing about regulatory laws to assure pilot instrument proficiency, Lear foresees at least one lightplane crash a week in the nation.

Instrument proficiency requirements would reduce all flying accidents, caused by the loss of visual reference to the ground, by "90%," he further stated.

Lear further stated that, within ten years all passenger planes will be equipped with proximity warning devices which will reduce such mid air collisions as Pacoima and Grand Canyon to nothing.

Although Lear recognized the slump in present-day sales in the business aircraft business, he expects 40,000 business aircraft to be licensed in the next five years. The yearly production of business aircraft is now approximately 2000.

Oxygen Tests May Be Incorporated In CAA Physicals In Future

Someday a physical may include being placed in a pressure chamber.

In the Air Force, no pilot is allowed to fly in a jet until he has passed through the chamber and Air Force officials at Barksdale Air Force Base in Louisiana predict that business pilots may be required to take the same test when the jet age overtakes present propeller flying.

The Air Force admits flying at 40,000 feet is no problem but a hole in the cabin would change all that and knowing how to breathe can mean the difference between life and death.

Jet pilots are subjected to rigorous testing and schooling. One day business pilots may be doing their hangar flying while sitting in a pressure chamber.

Aircraft Collision Avoidance Research Under Way Again

Baltimore, Md., June 5—A three phase program designed to produce a practical aircraft collision avoidance research device is in progress. The Air Research and Development Command has let the contract for this project to the Bendix Radio Division of Bendix Aviation, Baltimore, Md. ARDC's Wright Air Development Center, Dayton, Ohio, will monitor the program.

The three principal phases of the contract are: 1) a study which will result in a technically sound definition and description of the proximity warning and collision avoidance problem; 2) a study of the various possible technical approaches to the solution of the problem, with an evaluation of each approach; and 3) the construction of a research model of a proximity warning—collision avoidance research device based on the technique deemed to offer the greatest advantages.

While several techniques were suggested by the Wright Air Development Center as possible approaches to the problem, no limits were imposed, and the study phases of the program will cover all known techniques which might conceivably be applicable.

Particular attention will be given to the possibility of using primary radar at short range on a non-cooperative basis. This requirement has been stated by the Air Transport Association as a prime requirement for the civil airlines. Maximum consideration will be given by the Air Research and Development Command to meeting the civil requirements in order to insure equipment compatibility.

In setting up the basic requirements that the accepted technique should meet, the contract provides a general outline of what the final device might be like.

The size of the equipment should not exceed 2500 cubic inches (which equals a box 10″ by 10″ by 25″), and its weight should be less than 50 pounds.

The overall system should be suitable for all-weather use in aircraft with speeds up to 1780 m.p.h. (mach 3.0) at altitudes up to 100,000 feet.

The maximum detection range of the system should be sufficient to provide collision avoidance maneuvering time at very fast closure rates (up to mach 6.0).

The area around the aircraft from which collision avoidance information is required would be essentially spherical in shape. This protecting sphere may be modified so that the maximum detection range is in the directions of greatest vulnerability to collision.

A warning device should be included, which will inform the pilot that another aircraft is nearby and provides clear-cut, unmistakable instructions for collision avoidance. Similarly, a means for automatically executing collision avoidance maneuvers by introducing appropriate electrical signals into the auto-pilot or flight control system of the aircraft is essential.

The research program called for under this contract is now in progress, and is scheduled to be completed by March 1958, with delivery of a flight-tested research model to the Wright Air Development Center at that time.

NACA Award for Crash Injury Research

The National Advisory Committee for Aeronautics has conferred its highest award, the Distinguished Service Medal, upon I. Irving Pinkel, aeronautical research scientist of the NACA Lewis Flight Propulsion Laboratory. His scientific research on causes of fire and impact hazards in aircraft crashes led to successful demonstrations of fire prevention equipment and to principles of seat design which enhance passenger safety.

Prior to the commencement of Mr. Pinkel's crash fire and impact research at Lewis in 1949, years of investigation of aircraft crashes in which fires occurred produced insufficient evidence to determine with any certainty the manner in which the fire started and spread. Detailed data on the origin and transmittal of fires after crashes was essential before airplanes could be built which incorporated design features and equipment to prevent fires following crashes.

During Mr. Pinkel's experimental work in crash fire research, a number of surplus aircraft were crashed under carefully controlled conditions. The runway, barrier, and impact area were designed to provide maximum crash severity and fire hazard. Extensive instrumentation and photographic coverage of the crashes obtained the previously lacking data on the origin and spread of fire.

Initial crashes were conducted to determine potential ignition sources and the manner in which these sources were contacted by flammable material. Resulting data enabled the design and building of experimental equipment to suppress ignition sources during the crash. Several following experimental crashes of a severity which had previously produced fires were made with this equipment. No fires ensued.

When Mr. Pinkel demonstrated that crash fires could be prevented, he turned his attention to the hazard of crash impact. This required a determination of how people are injured during aircraft crashes, and by what means these injuries could be prevented.

An additional series of airplanes were crashed under conditions simulating maximum possible impact without crushing the aircraft's cabin or cockpit. The aircraft structure, seats, restraining harnesses, and dummy occupants were instrumented to determine loads transmitted during crashes to the airplane's occupants.

This series of crashes produced data on forces and stresses exerted during crash impact on aircraft structures and occupants. A flexible seat which greatly reduces the impact hazard to occupants

was conceived and designed on the basis of this data.

Flying In The Back Country

Fall is the season when the executive aircraft oft find themselves flying into the back country for many reasons—fishing and hunting are two—but clients might be a third.

Fall is also the season when winds get gusty and each pilot should shore himself up on some techniques which tend to become hazy or loose as a goose.

For example, during periods of strong winds, substantial downdrafts may be encountered on very hot days where the heated runway and relatively cool adjacent wooded or water areas set up local conditions.

When the airport has a dropoff and the winds are high, caution should be exerted.

Certainly, under these conditions, a short landing should never be tried because of burbling winds over the dropoff.

It is far better to make a high approach with a little less power and a greater rate and angle of descent.

Hanging on a prop in a high wind, gusty condition is flirting with suicide and certainly no way to bang horns with a downdraft.

So the word this fall is caution.

National Weather Forecasting Corp. Offers New Weather-Reporting Service For Business And Private Pilots

National Weather Forecasting Corp., a new important weather service geared to the need of increasing numbers of business and private pilots for more dependable, accurate weather-reporting information, is now operating at Hangar 12, Newark Airport, Newark, N. J.

Operators of this new service offer both on-the-spot and comprehensive "weather" for all aircraft, on a subscription basis. Three types of service are available: 1) "spot" briefing at any hour of day, month or year on a 24-hr. basis; 2) briefing at regular scheduled hours of any day, either daily, semi-weekly or monthly; and 3) on a one-time basis only. In addition, 48 hours in advance a 2-, 3-, or 4-day weather forecast and picture maps are available to the subscriber. This service is synchronized with the particular characteristics of the aircraft and/or business or private pilot concerned. Minimum subscription fee is $25. per month for a total of 5 weather forecasts, including flightplan, profile map, advisory service, and latest information pertinent to the flight planned.

In operation, National Weather Forecasting records the new subscriber's type of aircraft, range, pilot's rating and commercial, instrument or ATR, data concerning landing minimum, plane ceiling, hours of flight averaged per month, average length of flight by hours and miles, icing equipment available, radar or non-radar equipment and engine speed. Then, when the subscriber phones in over his specially designated code number (line is always open because of non-listed telephone lines arrangement), reference to his card file data is instantly made. He then receives the specially interpreted weather forecast based on the known characteristics of his aircraft.

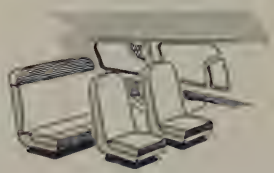
Major advantages of the service: it increases the safety factor in flight for the pilot user; recommendations, with briefing as desired, as to the actual flight plan; and the elimination of time delays and communications lag for pilots in obtaining standard weather information, then interpreting such information.

National Weather Forecasting Corp. employs the most advanced meteorological equipment, and highly trained personnel. Established by former Marine Pilot Officer—now president, Harry Van Liew, NWCF plans to retain commercial airline pilots who will call in actual wind and weather conditions over routes they have covered, at the end of each trip, throughout all major points in the United States. This information will be interpreted and processed by NWFC personnel for maximum accuracy of service to its subscribers.

Did you know there were 5 million takeoffs and landings at the nation's airports in 1936? There are now 65 million and in 1975 the forecast is for 115 million.

SOME OF THE ADVANCED FEATURES WHICH MAKE THE NEW

NEW
completely sealed
interior



NEW
more usable cabin space
with scores of extras!

NEW
heavier windshield
and windows

NEW
functional
panel grouping

Now...a whole year ahead...the fast Cessna 310B fo

Here's twin-engine flying's greatest comfort achievement—a completely new and roomier kind of cabin. It's sound-sealed and fully insulated... soft and spacious, to wrap you in restfulness, the whole quiet 213-* mile-an-hour ride!

* See specifications

It's the most advanced twin in the sky, this fast and beautiful new Cessna 310B.

Far more than just a "warmed over" model, it's truly next year's airplane here today, with all the advanced performance and safety features that have made the 310 famous—unequalled power per pound of weight, wing-tip safety tanks, superb "engine-out" dependability. And now, you get all this plus a completely new kind of cabin comfort!

There's new quiet in the Cessna 310B, because its Comfort-Sealed cabin is completely insulated from floor to ceiling and all around; its windows and windshi double-heavy and vibration-free.

There's constant climate control with its brand-n heating and ventilating system that surrounds you w a soft flow of fresh, cooling air in summer—and winter, blankets you in warmth from its "doub capacity" heater.

And there's real deep-cushioned comfort in its new wider cabin—with extra room where you want it mo You can choose the fully adjustable all-in-one rear s that tilts back for lounging at a touch, or optio

ESSNA 310B THE WORLD'S BEST ALL-AROUND LIGHT TWIN:

NEW
fully adjustable seats*
*separate reclining rear seats optional

NEW
giant 19-cu. ft.
baggage compartment

NEW
"double-capacity"
cooling & heating

NEW
fully retractable
double step

958!—with the revolutionary "Comfort-Sealed" Cabin

eparately reclining rear seats (comfort experts say hey're the most perfect airplane seats yet). You also et such new and luxurious extras as rear-seat arm-ests, full-width magazine racks, and sparkling new abric and color combinations. Front seats, too, are ully adjustable, softer and more relaxing than ever.

But all this is only the beginning! You'll see a new, more functional kind of instrument panel, grouped for easier I. F. R. flight, with new nonglare "post" lighting. A new, bigger baggage compartment. A new retractable double step to make getting in and out really easy. New, easy-opening cowling fasteners for quicker engine maintenance.

One look, one flight at your Cessna dealer's will prove it! This is the most advanced twin available today. He'll show you scores more new features, from an improved oxygen system to new and luxurious carpeting, a bigger luggage shelf, a better taxi light—even new giant-size ash trays!

The Cessna 310B is priced (with std. equip.) at $59,950 f.a.f. Wichita. See your Cessna dealer or write CESSNA AIRCRAFT CO., DEPT. AS-10, Wichita, Kan.

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FOR EVERY BUSINESS NEED

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Special Service Frequencies

The result of National Business Aircraft Assn. efforts to procure a "working" frequency to meet the needs of business aviation became official on July 15th, 1957.

The meat of the revised Part #9, FCC Ref., reads:

9. 1004 Scope of Service. (a) At all times when an aeronautical advisory station is in operation, non-public service shall be provided to any private aircraft station upon request and without discrimination.

(b) Aeronautical advisory stations shall not be used for air traffic control purposes.

(c) Communications on the frequency 122.8 Mc shall be limited to the necessities of safe and expeditious operation of private aircraft, pertaining to the conditions of runways, types of fuel available, wind conditions, weather information, dispatching or other necessary information: Provided, however, that on a secondary basis, communications may be transmitted which pertain to the efficient portal-to-portal transit of which the flight is a portion, such as requests for ground transportation and food or lodging required during transit.

(d) Communications on the frequency 123.0 shall be limited to the necessities of safe and expeditious operation of private aircraft, pertaining to dispatching and other information concerned with regularity of flight: Provided. however, that on a secondary basis communications may be transmitted which pertain to the efficient portal-to-portal transit of which the flight is a portion, such as requests for ground transportation and food or lodging required during transit. The frequency 123.0 Mc is not available for civil defense communications.

(e) The frequency 122.8 Mc may be used, in addition to its normal purposes, for communications with private aircraft engaged in organized civil defense activities in time of enemy attack or immediately thereafter, and on a secondary basis for communications with private aircraft engaged in organized civil defense activities in preparation for anticipated enemy attack. When used for these purposes, aeronautical advisory stations may be moved from place to place or operated at unspecified locations, except at landing areas served by other aeronautical advisory stations or airdrome control stations, or both.

The Federal Communications Commission has indicated to NBAA that numerous applications for licensing of a "Special Service" frequency station using 123.0 mcs have failed to comply with the following provision of the FCC Report and Order. *Applicants must follow this section of the order before any consideration can be given:* "It will, therefore, as in the past, be incumbent on the airport owner (who does not wish to be licensed and operate the desired facility in his own name) to designate another person or organization as sole operator. Accordingly, as a matter of policy, applications filed by such operators will be considered by the Commission, if supported by a statement that the applicant has been designated as the sole operator, for advisory station licensing purposes, under the terms of lease or other suitable agreement."

FCC has indicated that as many as four or five applications have been received for station licensing from one airport.

Jet Electronic Aids Will Fit Business Planes

Baltimore—Communications and navigation equipment that meets airline performance standards, but is light and compact enough to be used in the smallest twin-engine business planes, has been perfected by the Radio Division of Bendix Aviation Corporation.

The new equipment achieves an overall weight saving of 46 per cent

ELECTRONIC AIDS FOR JETS can fit business planes: Communications and navigation equipment of airline-performance standard, light and compact enough to be used in the smallest twin-engine business planes, according to Bendix Av. Corp.

and a space saving of 33 per cent over the corresponding heavier units used up to now. Printed wiring, transistors and other advanced design techniques are used on the various components to achieve the space-weight saving and lower electrical power requirements. The new equipment includes:

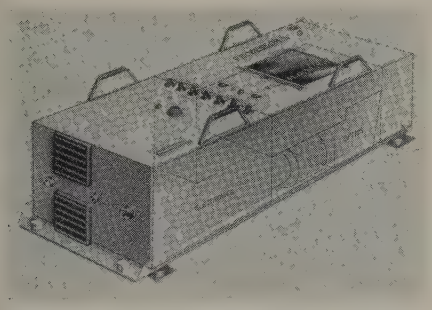
1. TA-21A lightweight, remotely controlled transmitter with crystal-controlled transmission on 360 channels, 50 kilocycles apart in the 118.0 to 135.95 megacycle range. Twenty-five watts of r-f output is available throughout the entire frequency range of the unit, which is housed in a short 3/8-ATR package including interchangeable AC or DC power supply.
2. RA-21A lightweight, remotely controlled communications receiver providing crystal-controlled reception on 560 channels spaced 50 kilocycles apart between 108.0 and 135.95 megacycles. It is a self-contained unit housed in a short 3/8-ATR package and weighs 9 pounds, including interchangeable AC or transistorized DC power supply. The unit may be used alone as a communications receiver or with the NVA-21A Navigation unit to provide complete VOR/LOC facilities.
3. NVA-21A lightweight, fully transistorized airborne navigation unit for use with VHF receiver (above) to provide complete VOR/LOC course information. Although housed in a short 3/8-ATR package weighing 11½ pounds, it incorporates all of the audio and instrument circuits required for complete automatic instrumentation.
4. MKA-7A marker receiver; a compact, single-channel receiver for reception of marker beacon signals from airway fan markers, station locator Z markers and ILS approach markers. The crystal-controlled, single-conversion, superheterodyne receiver operates on a fixed frequency of 75 megacycles. The entire unit is housed in a ¼-ATR package and weighs 8½ pounds, including power supply.
5. GSA-8A glide slope receiver. Housed in a short ¼-ATR package weighing 7¼ pounds with a self-contained transistorized DC power supply (or 7½ pounds with an AC supply), the unit is a 20-channel UHF receiver designed to receiver 90/150-cycle, tone-modulated glide slope signals for vertical guidance information during ILS operations. The output of the receiver operates the horizontal pointer of any standard flight path deviation indicator. Used with the No. 2 and No. 3 units mentioned above, the receiver provides complete ILS receiving facilities—both receivers being operated at the same time from a single control panel in the cockpit.
6. AMA-10A passenger address amplifier, a fully transistorized, lightweight audio system for commercial aircraft. The unit, which also can be used for recorded entertainment, provides extreme flexibility and maximum efficiency. Fifty watts audio power is available from five plug-in modules . . . each providing 10 watts of power. Five modules can be housed in a single ¼-ATR package. The unit can be made to fit the requirements of any particular aircraft and weighs only 6 pounds.

Rice noted that weight and space requirements for navigation-communication equipment aboard jet airliners is especially critical because modern, high-performance aircraft call for electronic systems to control virtually every aspect of flight. This, in turn, places a premium on space and weight given over to navigation and communications systems.

In the case of the rapidly expanding business aircraft field, he added, there has been a pressing need for a similar space-weight saving to permit lighter planes to use airways and airports under IFR conditions.

Instant Radar Map for In-Flight Use

Pilots and navigators have had many types of radar displays to interpret in flight. Over the past ten or more years, scores of different types of pictures have been presented on the faces of cathode ray tubes in flight compartments. Each new method is usually entirely different from all its predecessors. In general, none of them except the PPI-scope have resembled the actual lay of the land to any great extent. The great majority of radar presentations show a series of blips on a cathode ray tube which must be interpreted by highly-trained technicians. The PPI-scope, or plan position indicator oscilloscope presentation, looks very much like an actual map of



the ground below. However, due to the very nature of airborne radar, the PPI presentation picture changes continuously while the airplane is in flight and while the radar antenna examines the ground below.

Hycon Mfg. Company of Pasadena, California, has developed a radar strip recorder which maintains the advantages of a PPI-scope presentation while eliminating most of the disadvantages. The radar strip recorder makes an actual photographic record of radar information on a slowly-moving strip of film. The film is 9½ inches wide and is passed over a viewing screen so that the observer looks at a transparency approximately 9x12 inches in size. The transparency pictures the ground immediately aft of the airplane, exactly as it looked to high-precision radar only twenty seconds previously. The film picture does not change, but rather the long strip of film is slowly wound from one spool to another. The speed of film travel can be controlled to correspond to airplane velocity. A permanent film record of the flight path of the airplane results; and in addition, the pilot, navigator, or observer has at his command a precisely accurate picture of the ground below which is reliable day or night, in clear weather or cloudy overcast conditions. The system combines the advantages of radar and photography.

One immediately apparent application of this radar strip recorder system is in precise navigation. The navigator can make measurements on the film transparency to determine exactly how far off course he is from a desired flight path. Since the strip recorder contains automatic circuits to "flatten" the ground picture as seen by radar, and manual controls for setting in ± 12° wind drift, the radar map which results in the machine can be compared directly with a topographical map or aerial photograph of the region below. Either of two areas of coverage can be selected with initial models of the strip recorder. If a 45x60 mile area is scanned, the resulting photographic map has a scale of 1:500,000. If a 22½x30 mile area is chosen, the map presented has a scale of 1:250,000.

Previous radar presentations have been confined to qualitative pictures of the ground which last but an instant, only to be wiped away and replaced with new information in a second or less. The radar strip recorder maintains its picture for quantitative use in the air.

One use which the strip recorder might find is in the analysis of airplane crashes. A suitably mounted strip recorder could be recovered from a wrecked airplane, and its permanent film record would provide an indisputable record of the flight path of the ill-fated ship.

Installation of the radar strip recorder in an airplane is expected to replace, rather than augment, certain existing radar display installations. The information presented to the observer by the device will take the place of current, less sophisticated radar display systems which exist today.

Associated with the strip recorder and one of the key elements in making

(*Continued on page 44*)

BUSINESS AIRCRAFT—

Yesterday, Today and Tomorrow

Panel Address by NBAA Representative G. Edward Rice
For Business Aircraft Panel at
The Institute of Aeronautical Sciences Summer Session
At Biltmore Hotel, Los Angeles, June 19, 1957

It is very gratifying to the National Business Aircraft Association to see this Business Aircraft Panel occupying such an important spot on the agenda of this meeting. This is certainly indicative of the recognition of the business aircraft market by the engineering personnel of the industry and of their desire to learn more of the needs for aircraft and equipment in this rapidly growing field.

In order to forecast future needs with a reasonable degree of accuracy, it is necessary for us to evaluate our progress to date and the basic factors which have affected it. So, let us take a backward glance to business flying as it was twenty years ago in 1937.

At that time, the business aircraft fleet in the United States involved less than 1500 airplanes of which less than 100 or about one quarter of the number then used by the airlines were multi-engine aircraft. While there were a few business aircraft capable of cruising speeds of 180 to 200 mph, the average cruising speed was around 100 mph.

Many of the business aircraft were not equipped with radio or lights for night flying, and the vast majority had only a radio receiver and navigation lights. Full instrumentation and two way radio were generally found only in the multi-engine or larger single-engine aircraft and dual radio equipment or ADF's were a rarity. An automatic pilot was an item used only in a few airliners. A small percentage of the flight personnel were capable of instrument flying, and none of the aircraft could be considered capable of all weather flight. Consequently, nearly all business flying was conducted in the daylight hours in VFR weather.

These conditions resulted in very low aircraft utilization and very high hourly operating costs. Business flying was a luxury reserved for a favored few top executives or businessmen. Only about ten aircraft costing over $75,000.00 were being operated for business transportation.

Today, sparked by decentralization of business activities, scarcity of key personnel and airplanes of vastly greater utility, business flying involves the use of twice as many multi-engine airplanes in the $75,000.00 to $1,000,000.00 price range as comprised the whole business fleet in 1937, and also double the number of aircraft presently used by the commercial airlines. The airplane is recognized as a valuable tool of business and a means of considerably reducing business operating costs and increasing business income. As a result, the business fleet now totals over 26,000 airplanes valued at about $300,000,000.00, fifteen times the size of the 1937 fleet and fifteen times the number of aircraft now in use by the commercial airlines.

Now, instead of the business airplane being reserved for the favored few, it is commonly used to meet general personnel transportation needs as in the case of my employer, Aerojet-General Corporation. Our fleet of three multi-engine aircraft are used to transport our personnel between our plants and in visits to customers' facilities within a 600 mile range. Any Aerojet-General Corporation employee, who has reason to travel to these facilities may fly in these aircraft. The three aircraft total about 3000 flying hours per year with over a 90% load factor. In addition to carrying passengers they carry over 100,000 pounds of classified mail and express annually.

It may be readily seen that such operations are profitable from the standpoint of savings in personnel and material transportation costs alone. In addition, in these days of scarcity of key executive and technical personnel, the availability of convenient air transportation permits one man to supervise related activities at two plants, resulting in considerably better coordination of interplant activities and considerable savings in personnel costs.

Many businesses are gaining similar savings on a hemispherical or even global operations basis. Frequent business flights are conducted between the North and South American continents, and one oil company operates its own fleet of four engine $1,000,000.00 transports from the United States to Saudi Arabia on a regular schedule. Here again the air transportation is available to any employee who has need to travel in these areas.

The majority of the larger multi-engine business aircraft are of World War II transport or converted bomber types because these have been the only aircraft readily available in sizes suitable to corporate needs. However, improved electronic equipment, more powerful engines and many modifications have greatly improved their all weather capabilities, their load carrying capacity and their performance. It is not uncommon for a modified transport type business aircraft to involve a cost three to four times its original cost in the late 1930's.

The average large business aircraft is as well or better equipped and maintained as the finest of our modern airliners, and modern airline type aircraft are being purchased in increasing numbers to meet business needs. It is interesting to note that there are more automatic pilots in use today on business aircraft than on airline aircraft.

Typical of the efforts of business aircraft operators to gain the utmost in versatility and safety in their aircraft is the increasing number of installations of standby rocket engines for emergency use. These rocket engines provide instantaneous thrust on demand to permit safe operations from high altitude and short fields at off-airways destinations often visited by the travelling businessman. Just as in the case of the electronic equipment which adds to the utility and safety of the aircraft these rocket engines contribute to the safety of the aircraft in all phases of operation.

While currently used business aircraft are generally somewhat slower than the faster airline aircraft, their use saves time for the businessman by permitting him to establish his own schedules and fly directly to his destination. The larger business aircraft also provide facilities for the conduct of business or for rest enroute resulting in further time savings.

Acceptance of slower speed aircraft by business organizations should not be

construed as being indicative of their desires. They have done their utmost to increase the performance of the airplanes available to them and are now buying faster aircraft as they are made available. A number of turbo-prop and jet powered aircraft are already on order or in process of delivery.

Looking forward to 1977, the General Aviation Facilities Planning Group forecasts that one quarter of all first class business transportation in the 100 to 1000 mile range will be in business aircraft, and that there will also be a considerable increase in business aircraft flying for longer ranges. It is forecast that the business fleet will exceed 50,000 airplanes with a value of over a billion dollars and will fly over 11,000,000 hours per year. It is estimated that multi-engine business aircraft will outnumber airline aircraft by at least seven to one.

There will be needs for increasing numbers of single and multi-engine helicopters or other short takeoff and landing aircraft, reciprocating single and multi-engine aircraft with minimum cruising speeds of 230 mph, single and multi-engine propeller turbine aircraft with minimum speeds of 400 mph, and multi-engine turbojet aircraft in the 600 mph cruising speed class. Just as there are aircraft flying today which were flying in 1937, there will be aircraft flying in 1977 which are flying today. However, the majority of these aircraft will be built in the next two decades.

It is believed that reciprocating engines will be used principally in the smaller and shorter range aircraft; propeller turbine engines in medium to long range aircraft especially in sizes of over 20 passengers; and turbojets in high speed long range aircraft of under 20 passenger size. It is felt that the cost of larger jets will make their use generally prohibitive in business. On the other hand, shaft turbine engines with demonstrated reliability may find more widespread use in helicopters or the faster single engine propeller driven aircraft as the operating efficiency of such engines improves.

Those of us who are regularly working in the business aircraft field feel that many of the aircraft manufacturers are to be commended for their foresight in their continued development of aircraft for these markets. However, we have wondered at the reasoning of some of the major manufacturers who have been willing to spend many millions of dollars competing in an airline market of a few hundred jet or turbo-prop airplanes, yet showing reluctance to expend a fraction as much to develop an airplane for this market which totals thousands of airplanes and as great or greater dollar volume potential. We are pleased to hear of developments now belatedly in process among some of these manufacturers.

All in all, we feel that the forecasts which we have just made are extremely conservative. Surely, if we can increase our business aircraft fifteen-fold as we have in the past twenty years, doubling the number in the next twenty years should be a simple task. The market is here . . . all that is needed is continued development in this field on the part of the aircraft and equipment manufacturers.

In spite of our love for the business in which we are engaged, sometimes we in the aviation field need to be reminded to have faith in what we are selling.

Contraindications

(*Continued from page* 17)

spiratory disease.

8. Those persons who are in heart failure of any degree.

9. People with other than controlled, symptom-free Angina Pectoris.

10. Heart attack patients prior to six weeks after the onset.

11. People with contagious diseases.

12. Bulbar poliomyelitis patients.

13. People with wired jaws, large unsupported hernias, draining or open abdominal wounds, intestinal obstruction, wet gangrene, odorous colostomies, and post surgical patients, prior to ten days after surgery.

14. Psychotic or potentially psychotic people.

15. People who do not have control of bodily functions.

16. Persons suffering from the bends.

How RADAR Increases AIR SPACE UTILIZATION

Civil Aeronautics Administration Federal Airway Plan—Fiscal Years 1957-62

This is a condensation of the latest CCA "Federal Airway Plan." It covers six fiscal years, 1957-62. The implementation schedule for FY 1958 has been coordinated in the Air Coordinating Committee, and proposed programs for succeeding years will be presented annually to the Air Coordinating Committee so that comment can be received from associations or airspace users, aviation interests, and the civil and military agencies of the Government.

The Federal Airway policy of the United States provides for a single common civil-military system of air traffic control and air navigation which shall be capable of immediate integration with the defense system of the United States. The CAA has three essential responsibilities in this regard: to provide navigational aids, to furnish traffic control service, and to give informational service for planning and conduct of flight.

This plan contemplates that traffic bottlenecks will be successively broken and safety enhanced by increasing the ability of traffic control facilities to safely handle a greater flow of traffic; the capacity of the system will be expanded by multiple airways and extension of the airway network.

• TERMINAL AIR TRAFFIC:

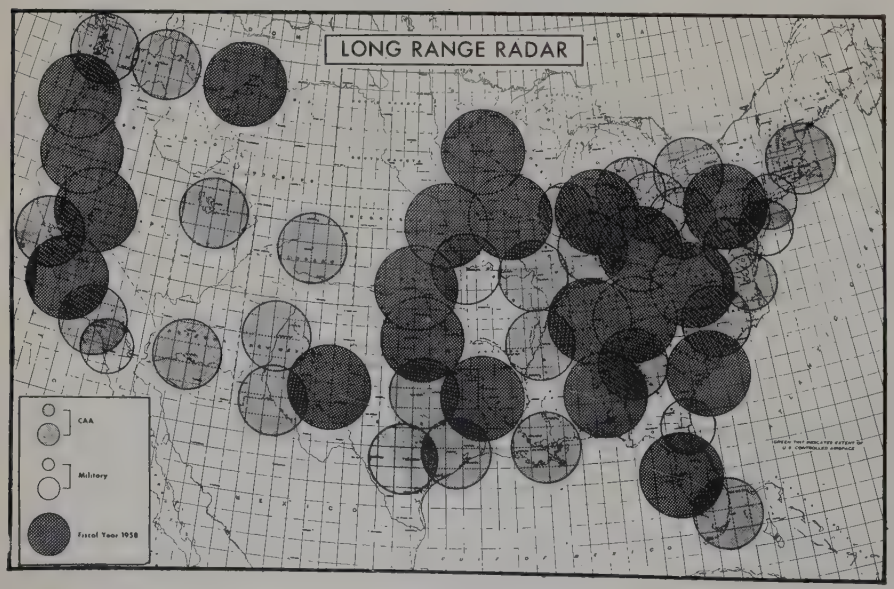
Air commerce activity is concentrated in the relatively few metropolitan areas or independent cities having economic and geographical attributes unusually favorable to air transportation, known as Air Traffic Hubs.

Since 1946, aircraft operations at airports with CAA traffic control service have increased at an average annual rate of 14 percent. The forecast for 1960 is 22 million and for 1965, 30 million aircraft operations. Instrument approaches have increased at an average annual rate of 22 percent in the period 1946 through 1956. Due to the expanded volume of business flying in the past few years, instrument approaches reported for general aviation aircraft have increased at an annual rate of 14,500, or 39 percent since 1953. This represented nine percent of the total instrument approaches made last year. The forecast for 1960 is 1.6 million, for 1965 2.6 million and for 1970 3.3 million instrument approaches.

The bulk of all flights have a range of less than 500 miles with more than 50% of all IFR flights going less than 200 miles, all aviation considered. Long-haul flights are important individually, but numerically constitute only a small part of en route air traffic.

(Ed. Note: This particular statistic is misleading. In fact, the clear majority of complete flights flown *totally* IFR plan is far in excess of 200 miles. In practice, pilots regularly employ IFR flight plan to depart from, or effect arrival in, a localized weather condition of 200 miles or less, usually only a fraction of their entire flight.)

The problem of air traffic control is not limited to the volume of air traffic alone. It is also affected by the variety and performance of aircraft in use, and these factors give every indication of becoming more critical in the immediate future.



• OPERATIONAL IMPROVEMENT PLAN:

Expansion of the air navigation network is based on two objectives (A) increased traffic capacity and (B) extension of navigation coverage.

A. Increased traffic capacity will be accomplished by:

1. Rapid, discontinuance of the L/MF facilities for IFR use is proposed. This will have the effect of greatly expanding available air space and eliminating numerous points of traffic conflict.

2. Revising the Victor airway structure to make optimum use of express airways.

3. Stratification of air space to segregate long-haul and short-haul traffic.

4. Installation of additional azimuth-and-distance facilities in major terminal areas to provide lateral separation of ingress and egress routes to the maximum extent possible, and segregation of over-flights from terminal area traffic to expedite the over-all flow of traffic.

5. The installation of additional azimuth-and-distance facilities on high-density routes to provide multiple express airways, laterally separated.

6. Additional flexibility in the selection of radio fixes, especially through the use of distance—measuring facilities.

B. Extension of the air navigation system will be accomplished by:

1. Establishing additional azimuth-and-distance facilities and terminal aids.

2. Extending azimuth-and-distance coverage on existing and planned airways down to 700 feet above the ground for the added safety and efficiency of the great volume of VFR operations.

3. Providing interference-free azimuth-and-distance coverage over the entire Continental United States from 18,000 feet to 75,000 feet m.s.l. to serve turbine aircraft and other high-altitude operations.

4. Installing precision approach aids —ILS and approach lights—to enable instrument let-down to be made safely with lower ceiling and visibility minimums at more airports.

Jack Herlihy (C), Vice President of Engineering & Maintenance, and William C. "Red" Mentzer (R), General Manager of Engineering, discuss precision operation of UAL's San Francisco Maintenance & Engineering Base with Fisher (L).

Another in a series on the care taken by leading airlines to maintain top flight efficiency—and why this care has led them to select

CHAMPION SPARK PLUGS

Noted aviation authority reports on United Air Lines...

"Red Carpet" On The Mainline

By HERB FISHER
international aviation authority, veteran test pilot, author

United Air Lines' Red Carpet service means luxury all the way — the Mainliner way.

The flying Red Carpet fleet is aloft 1,700 hours a day, safely covering 380,000 miles every 24 hours.

Last year, United flew more than 6 million passengers along its 14,000 miles of routes serving 80 cities in the United States and Hawaii. More than 4 million people enjoyed Mainliner first-class service while almost 2 million rode United's comfortable coach flights, both the last word in safety and dependability.

To the aviation industry, safety and dependability are more than words. They're goals for achievement. And when I visited UAL's San Francisco Engineering and Maintenance Base, I saw the inside operation that makes safety and dependability a red-carpet fact for the No. 1 coast-to-coast airline.

"Here we do all the heavy maintenance," Jack Herlihy, Vice President, Engineering and Maintenance, told me, "and our first objective is to achieve the maximum humanly possible in safe aircraft for the traveling public."

Under the direction of a dynamic trio — Mr. Herlihy; W. C. "Red"

Mentzer, General Manager, Engineering; and W. P. Hoare, General Manager, Maintenance — engineering and maintenance personnel combine to guarantee top operating efficiency of United's 180 aircraft. All old friends of mine, these three men and their dedicated staff are a driving force there at the SFO Base.


HERB FISHER

I spent several days at this 128-acre maintenance base fronting on San Francisco's International Airport. There wasn't a section of the million square feet of floor space I failed to see — hangars, overhaul docks, shops, test cells, storage and stock areas, service and training headquarters, office buildings, even the aircraft run-up pads — all of it comprising a "push-button" maintenance base that's recognized as one of the most modern and complete in the nation.

From a small, split operation at Oakland Airport and Cheyenne, Wyoming, in 1941, United has mushroomed with atomic impact in the aviation industry. With today's maintenance operation centered at San Francisco, total UAL investment in buildings at year-end stood at $17,210,900, with 5,677 employees on a $31,789,662 payroll — just at San Francisco alone.

Current maintenance-hangar construction will boost United's San Francisco investment to $24,495,900 by June of 1958.

Each year, hundreds of skilled mechanics, technicians and craftsmen work with engineering specialists to overhaul 250 to 300 aircraft and more than 1,500 engines. Maintenance standards and procedures are rigid.

On a precise schedule of preventive maintenance, each UAL Mainliner and Cargoliner is routed to San Francisco for progressive overhaul. This is planning at its best. It is one of the most perfectly synchronized operations I've ever seen.

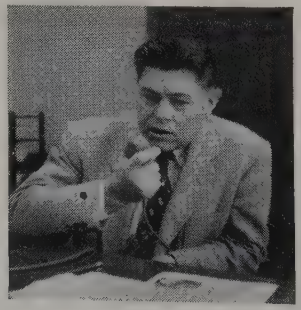
A Mainliner is assigned a hangar. Ten minutes after being squired into position, it is literally caged by catwalks, frameworks and platforms. Powerful jacks lift the plane. Overhead cranes move in to support engines while they're dismantled. Control surfaces, instrument panels, wheels and brakes, seats, buffets and all other removable components are "pipelined" to their respective shops. Metal workers, X-ray specialists and inspectors move into the stripped fuselage to probe for metal fatigue, corrosion and wear.

Meanwhile, the giant engines have gone into the Powerplant Section, where they're steam-cleaned, torn down, and part-by-part chemically washed and minutely examined, in strict conformance to United's rigid specifications.

After engine reassembly, valves are adjusted, timing is set and test cells are readied. There, with the deft care of surgeons, specialists check each engine pulse to doubly assure perfection before mating the engine with three others to form the safe and dependable power package of a UAL Mainliner.

"Dependability is of such great importance," Red Mentzer told me, "that we cannot afford to use a

Fisher discusses extensive flight testing of reconditioned aircraft with (L/R) Robert M. McIver, Test Pilot; W. E. "Dusty" Rhoades, Flight Engineering Manager; and Robert C. Collins, Test Co-pilot.



"Usually, where statistical data blames spark plugs for ignition system troubles, we find the spark plug is the victim and not the cause," reports Bill Pitt, Line Service Engineering Manager.

"Rule of Five" sign points up safety, passenger comfort, schedule performance, honesty, sincerity. Pictured are (L/R) Fred Page, Maintenance Division Manager; H. R. Williams, Powerplant Manager; Hadley Queen, Maintenance Manager Assistant.

second-rate product any place in our operation.

"Take spark plugs," said the top man in Engineering and 24-year UAL veteran. "We've been using Champions as standard equipment on all of our airplanes for more than 10 years. We've tested many different types of spark plugs during that time. We've found, however, that Champion has developed its product more rapidly than anyone else. Result is – since we've used Champions we've enjoyed the best over-all ignition experience of our entire history."

As Jim Goodart, a maintenance expert in Line Service Engineering, put it: "We have yet to find one engine failure caused by a Champion Spark Plug. With these DC-7 engines costing about $120,000 each, the importance of product reliability is obvious. Sometimes a spark plug is blamed for trouble when actually it is not at fault. We've found that Champion is the best we could possibly use."

Harry Taylor, Superintendent of Powerplant Engineering, said: "We've always emphasized dependability, long life and economy. We feel that no other spark plug has thus far provided us with a full measure of these requirements."

Frank H. Griggs, buyer in United's Purchasing Department for 19 years, calls it business integrity and forward thinking on the part of Champion.

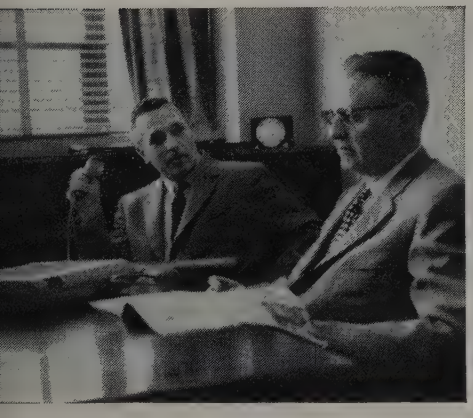
Just as a good airplane is the composite idea of designer, builder and user, so is development of a spark plug largely the result of cooperation between manufacturer and user.

One of United's technician engineers, Thomas Preitkis, told me this: "United has attended Champion Ignition Conferences every year for the past seven. There, airline operators get together with Champion engineers to discuss their problems. The result of such meetings is a spark plug that meets the needs of the airline operator, a spark plug offering greatly improved performance . . ."

Dependability the Champion way is 1,000 hours of service. New spark plugs are installed in UAL's Pratt & Whitney and Curtiss-Wright engines and, after 500 hours of operation, they're removed by line maintenance people and returned to the base for reconditioning. Then they're put in service for another 500 hours.

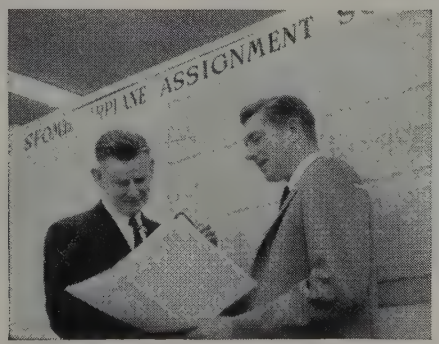
"In terms of operating costs," Bill Pitt, Manager of Line Service Engineering, told me, "Champion has been able to extend the time between spark plug replacements so that we are now realizing as high a time as any airline in the industry. This represents a saving in direct man-hours and in less frequent need for overhauling or service . . . " Mr. Pitt began his career with United 27 years ago as a cleaner and has progressed through all levels of mechanical maintenance. He speaks with authority, then, on economy and dependability.

"Actually, the spark plug is one of our finest tools for evaluating combustion chamber irregularities, such as burned pistons and valves," Mr. Pitt said. "By careful study of the electrode end of a spark plug removed from a malfunctioning engine, we've determined actual cause

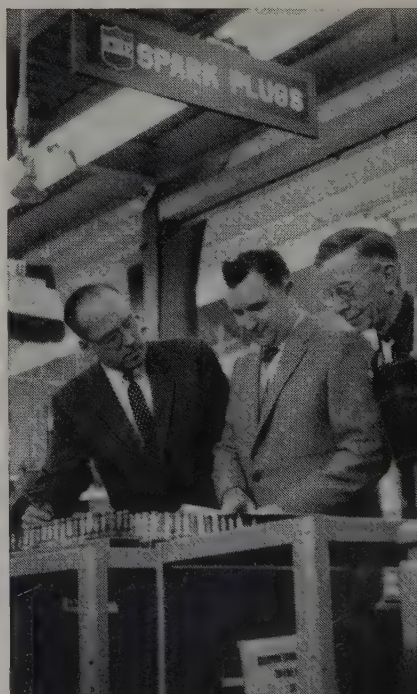


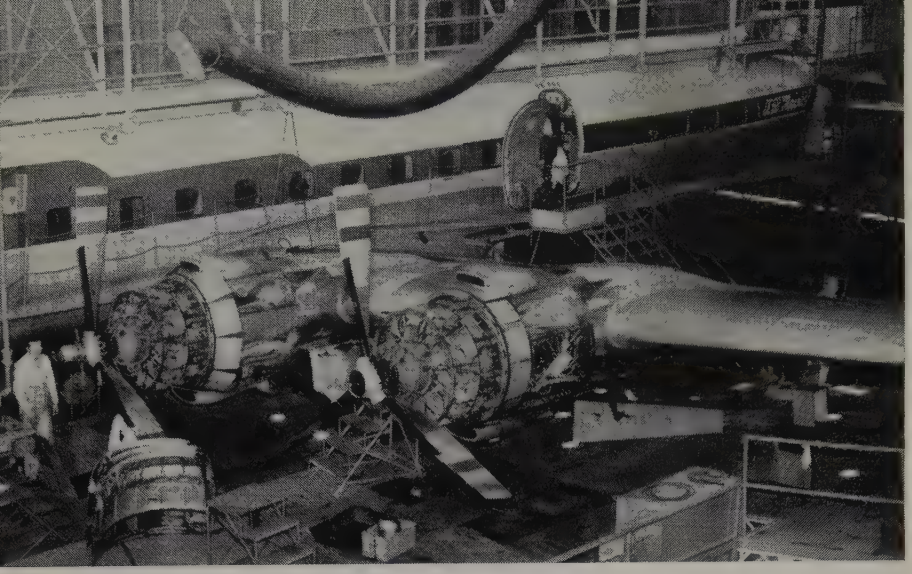
Describing tests of all kinds of spark plugs and reasons for using Champions exclusively the past 10 years are (L/R) Harry Taylor, Powerplant Engineering Superintendent, and Frank H. Griggs, Purchasing Department Buyer.

Planning precise scheduling for aircraft overhaul are (L/R) W. P. Hoare, General Manager of Maintenance, and G. E. Keck, Assistant to V.P. of Engineering and Maintenance.



Earl Koehler (L), Champion Representative, gives technical assistance to Tom Preitkis (C), Powerplant Engineering Assistant, and A. G. "Hap" Gronenthal (R) of Spark Plug Maintenance.





A Mainliner is reconditioned right down to the last nut, bolt and spark plug.

of the trouble and avoided some rather destructive engine failures."

General Manager of Maintenance — Mr. Hoare — emphasized UAL's success with Champions: "United's experience has demonstrated Champion's consistently dependable performance under widely varying operating conditions," said the 30-year UAL veteran.

Those who occupy the "front office" of the airplane itself, those who bear the final responsibility for safe operation of the aircraft in flight, have the deep personal appreciation of the meaning of reliability. United's Flight Test Section employs 15 experienced pilots and flight engineers. During a hangar flying session with these test pilots, I learned just what Champion does mean to them.

Robert M. McIver, a Test Captain for UAL, said: "My experience dates back to 1933 and includes some 10,000 hours' flying time, 6,000 of it flight testing. We have a tremendous sense of moral responsibility toward each airplane we release, since we realize each plane will cover millions of miles under all kinds of conditions before returning again for overhaul.

"Part of our job, then, is to devise exhaustive tests for each component of the plane, and these tests we carry out religiously. The work of Flight Test is the end point in a long line of maintenance and inspection procedures, and we have authority to fly each plane as much as necessary to insure the ultimate in quality. Each component must fall within very tight tolerances before it can be considered satisfactory. Naturally, the engines and their accessories are subject to very close scrutiny . . . and spark plugs fall into this category.

"During each flight test, our flight engineers observe spark plug performance continually by means of ignition analyzers, and pilots do likewise indirectly by means of the instruments on the power panels.

"Using this instrumentation, we've been watching the performance of Champion Spark Plugs for 10 years. The excellent characteristics of these spark plugs have become not just a matter of personal opinion, but a matter of statistical record. We can summarize that record by saying that Champions meet the tough requirements of an airline operation and are backed by a good service organization . . . "

Captain McIver's comments were seconded by UAL Test Pilot Robert C. Collins, who told me that so far as he knew no other spark plug has ever come close to replacing Champions at United.

UAL's record of safety and dependability reflects the reliability of the heart of its aircraft ignition system, the Champion Spark Plug.

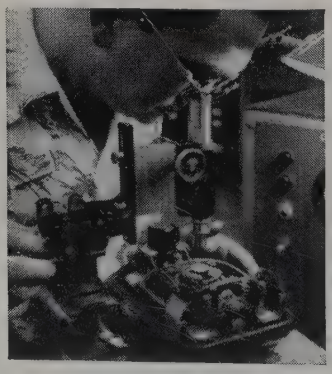
Red Carpet means *the finest*. To millions of passengers it means the ultimate in reliability, service and comfort. In a Mainliner, it means the ultimate in engineering and maintenance.

When you fly United, you're flying *Red Carpet*.

by HERBERT O. FISHER

Cabin view of Curtiss-Wright simulator, which electronically duplicates flying characteristics of DC-6B Mainliner, shows United crew solving flight problems "inserted" by instructors. UAL has seven of these — largest number owned by an airline — for advanced pilot training.

Harold McCray calibrates with fluxgate compass transmitter.

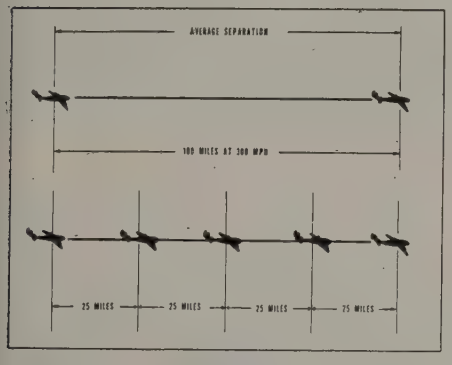


Unique with United is this special briefing room with a 14,000-mile view. Specialists brief company executives in Denver every morning on system-wide airline operations for past 24 hours — plus a forecast of the next 24. This contributes to constantly improved service.

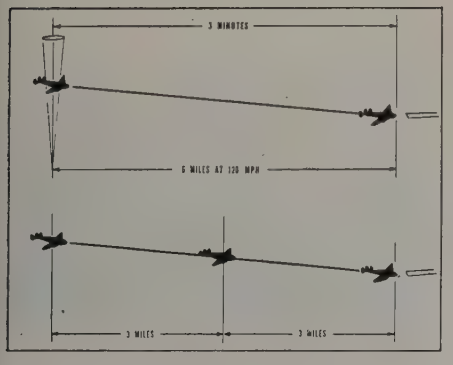
The plan proposes to improve communications by means of more peripheral facilities for direct controller-to-pilot communications. The objective in this program is to provide a separate, interference-free channel for each control sector or function. Also, the efficiency of collecting and disseminating meteorological and Notice to Airmen information will be increased. Additional airport traffic control towers and combined station-towers will be required as activity levels at airports, not now served, continue their upward climb.

CAA plans to inaugurate control of all airspace above 24,000 feet in the first part of FY 1957, and, as experience is gained in handling traffic at these altitudes, to lower the floor to 15,000 feet in FY 1958.

CAA planning with respect to air traffic communication stations for the next five years involves increased emphasis on the role of these facilities in providing flight assistance information to pilots and operators who do not have company resources, [Ed. Note: Certificated aircarrier requirement.] for this type of service. This will entail extension of private telephone lines to outlying airports which pilots and operators can use to file flight plans and arrival reports, check weather observations, forecasts, and NOTAMS and to receive an air traffic clearance prior to takeoff.



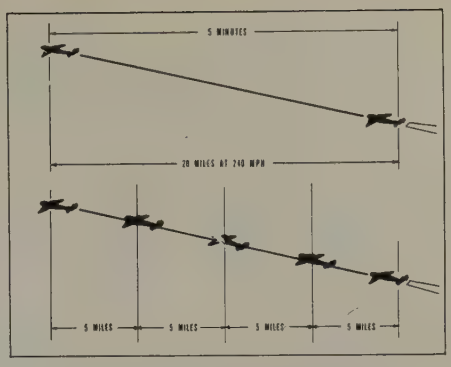
ENROUTE



ARRIVAL

• LONG RANGE RADAR:

Information received from these radars will be used in the air traffic control function so as to provide adequate



DEPARTURE (Over Same Route)

separation between aircraft in the enroute area.

It will increase safety and system-capacity by:

a. Providing a means of applying reduced aircraft separation.

(Ed. Note: For take-off purposes, Radar Departure service frequently enables runway separation only comparable to VFR operations, where flight paths diverge shortly after take-off.)

b. Provide a means for expeditious handling of aircraft on direct off-airway routes.

c. Expedite the handling of aircraft between radar approach control towers and air route traffic control centers.

d. Locating lost aircraft.

e. Assisting aircraft to detour around adverse weather.

The Plan indicates a requirement of at least 73 radar facilities, in addition to the planned joint use of at least 10 Air Defense Command radars.

• AIRPORT SURVEILLANCE RADAR:

This radar will detect most aircraft within a range of 50 to 60 nautical miles from the airport. The position of the aircraft is shown with a high degree of accuracy in distance and direction, but not altitude. The accuracy of the position information permits the use of a three-mile separation between aircraft operating at the same altitude. This allows a considerable reduction in the interval between successive landings and departures of aircraft, thereby reducing delays under high-density traffic conditions.

Airway Planning Standard No. 1 calls for the provision of airport surveillance radar at the major airport serving each large transportation hub or at an airport having a CAA airport traffic control service and 2000 or more annual instrument approaches.

• AIRPORT SURFACE DETECTION EQUIPMENT:

CAA plans to install these ASDE units at 74 locations through FY 1960. The program covers large heavy traffic metropolitan airports, taking into consideration for each location the following features: traffic volume; runway length; blind spots from towers; height of control tower, and weather factors.

• ATC RADAR BEACON SYSTEM:

The Radar Beacon System for air traffic control (ATC) is planned as an electronic means of detecting and identifying aircraft within a range of 200 nautical miles at altitudes from line of sight to 60,000 feet.

This is termed "secondary radar" because it depends upon the transmission of radar replies from the aircraft, while "primary radar" relies upon the reflection or echo. This system requires a ground interrogator and an airborne transponder. Should evaluation warrant, a total of 188 radar beacons is contemplated for civil surveillance radar systems through FY 1962, and 42 more for all operating and planned civil Precision Approach Radar (PAR) systems.

• AIR ROUTE TRAFFIC CONTROL CENTERS:

It is the responsibility of the ARTC centers to ensure the safe, orderly and expeditious flow of air traffic by providing appropriate lateral, longitudinal and vertical separation between aircraft under IFR conditions. The ARTC center will continue as part of the Common System during the foreseeable future. Future control of airspace above 15,000 feet will be based on the use of existing techniques, and the requirement that such aircraft file IFR flight plans.

• DIRECT CENTER CONTROLLER/PILOT RADIO TELEPHONE SERVICE:

Basically, this is an extension to centers of the direct controller/pilot communication service which was originally inaugurated in towers to expedite the movement of aircraft in the terminal area. The level of aircraft activity has increased to the point where it is necessary to provide each control position with an interference-free radio communication outlet.

• AIRPORT TRAFFIC CONTROL SERVICE:

An airport with 24,000 or more total annual itinerant and air carrier operations qualifies for CAA airport traffic control service, and 77 new towers are provided for on that basis.

• DIRECTION FINDING EQUIPMENT:

It is planned to install VHF/UHF direction finding equipment at all long range and airport surveillance radar locations. Plans also call for an integrated (military-CAA) DF network in the U. S. with air route traffic control centers serving as net control stations. Funds are scheduled under Tower improvements for 100 VHF/UHF DF sets to be bought in FY 1959 and 1960 for installation at air traffic communication stations and non-radar towers to fill in gaps and provide complete coverage.

• AIR TRAFFIC COMMUNICATION STATIONS:

The planned expansion of direct center/controller/pilot communication service will permit greater emphasis on the flight assistance and advisory service provided by ATCS's. In FY 1958 it is planned to readjust the service areas

(*Continued on page 56*)

Human Causes of Accidents

(*Continued from page* 18)

may be pertinent, such as the degree of necessity for completing the specific flight; 4) the in-flight information supplied to the pilot, which consists of all the background information previously indicated and the additional information supplied through the medium of senses.

Information is supplied from the instruments which gives the pilot knowledge of the working condition of the equipment, from communication received from the ground or other airborne flights, and from his own body, regarding his degree of comfort, alertness, motivation, etc. This collective information may overwhelm him; he may be incapable of adequately storing and processing all portions for optimal use. His physical, physiological or psychological limitations may be being exceeded; he may be uncomfortable, fatigued or suffering deficiencies of oxygen or food, which are lowering his ability to use other information, thus impairing his efficiency in arriving at a correct decision for a correct response. Also, information may be presented so slowly in relation to his information-decision-response sequence that time is inadequate for the completion of the sequence. In mid-air collisions, for example, although the information that he is on a collision course may be conveyed to the pilot, it is often delayed to such an extent that the completion of decision-action is not possible. Other delays occur in the time it takes to read and interpret various instruments, the time required for receiving verbal-instruction transmissions from the ground or other sources, and the time for activating the controls to modify the functioning of the equipment.

The Pilot—Decision

The process of decision may also be difficult if not impossible because the decisions required are basically outside of the pilot's capabilities within the time limits he has for these decisions. As in the case of mid-air collisions, the time allotted for decision is so short that a decision followed by action cannot be accomplished before the accident has occurred. In typical undershoot accidents, on the other hand, while there may be sufficient time at one point in the landing sequence, the amount of information which has been supplied is inadequate in relation to the pilot's built-in limitations so that a correct judgment (decision) in relation to distance and to rate-of-closure is not made. The human's ability to judge rate as well as his ability to judge vertical distances is not particularly acute, as is well known, and when he must integrate both of these judgments in a very limited time, the error-probability is quite high. This is due primarily to the physical limitations of the sensory systems of the body.

The pilot may actually be incapable of making decisions under some conditions because the entire information-decision-action sequence has been rendered ineffective because of the exceeding of various types of physiological tolerances. Hypoxia, carbon monoxide or toxic poisoning with various other substances which may be induced into his breathing environment may result in faulty decisions and reactions.

The Pilot—Action

Various limiting factors that may be important in determining the adequacy or inadequacy of actions include physical strength and ability to reach and manipulate various controls. Cramped crew-stations-space, and heavy and/or cumbersome clothing and equipment may also be limiting factors. Physiological disturbances or inadequate training or practice may also result in ineffective action; Psychologically-limiting factors such as the interference of habits from one cockpit to another may also affect correct action.

The information-decision-action pattern is basically an integrated closed-system feedback unit. Anything which deters one phase results in a distortion of the entire sequence. For example, the emotions of the individual may distort his perceptions thus invalidating the information; this leads to distorted decision, inappropriate action. Deterioration with aging may result in inadequate use of available information or in too slow a decision and/or inappropriate action. Any of these conditions, even though considered separately, must be recognized as parts of highly complex integrated patterns. (Ed. Note: This excellent study further deals with the information-decision-action sequence related to other personnel, and the sources of information available to the investigator, such as the accident site, witnesses, records, medical, training, aircraft, etc.)

The Final Goal

When the cause of one human failure accident is determined, the search for human factors in accidents has just begun. Only through the evaluation of repeated accidents can the relative importance of the various kinds of failures be determined. The investigator must not only determine the cause of an accident to his satisfaction, but must incorporate this information in a clearly presented report which when taken into conjunction with others furnishes the raw material from which the true role of the human in aircraft accidents can be evaluated.

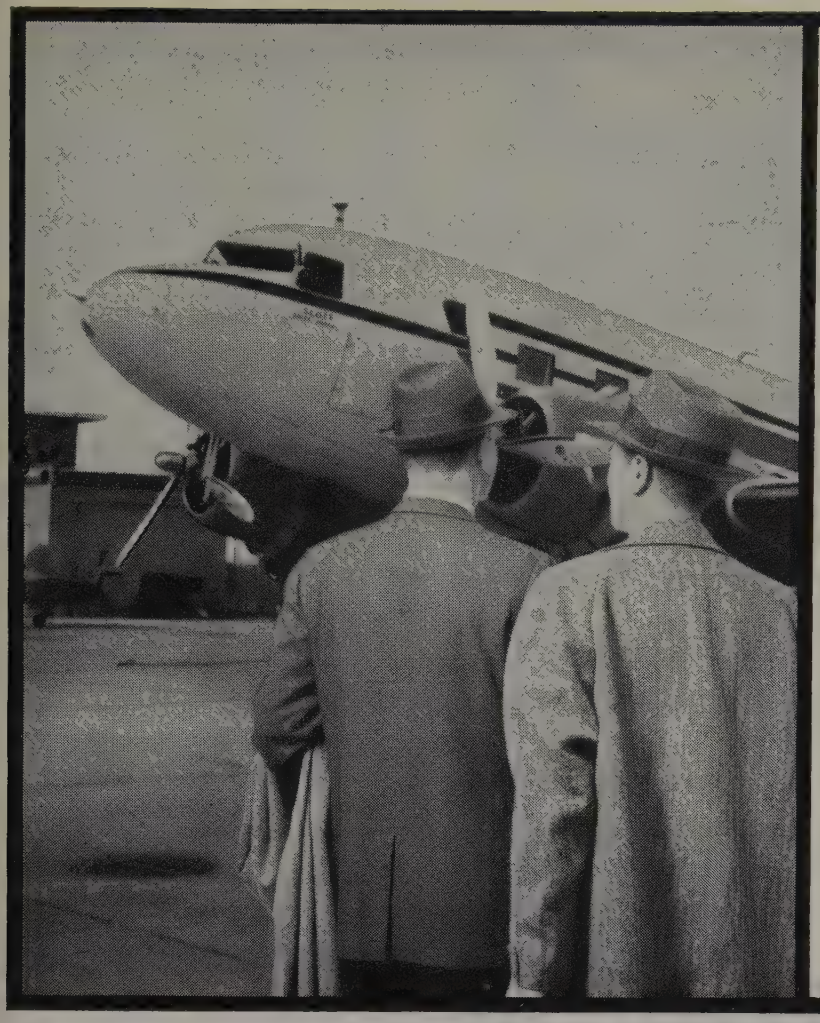
The *investigation of accidents* with a view toward defining the human component like other scientific arts is in a continuing state of development. With newer types of equipment which allow a wider range of environmental operating conditions, the number and variety of human limitations which may have a bearing on successful operation increase. The problem of rate-of-closure as it is related to mid-air collisions is now of great concern due to the increase in the number of aircraft in the air and in the increase in their performance. Human limitations will become even more pertinent with further increase in both of these areas. Effective operation at altitude has also become a problem only with the advent of aircraft capable of high-altitude performance. Human limitations related to higher altitudes and lower pressures as well as to the ability to withstand environmental extremes of heat and cold will continue to be of more concern with the introduction of newer types of equipment. Also of increasing interest will be the psychological limitations associated with high altitude and possible space flight. As these limitations become important for successful operation, they become equally important in understanding the accidents which occur during these operations. Only through sharing of current techniques and the developing of new techniques can the search for human factors keep pace with the increasing engineering performance being designed into aircraft.

Diligent efforts in the direction of defining and isolating the human factors as they relate to accidents may ultimately result in the successful definition of not only *what* happened but *why* it happened, and, what is more important, *how* future human-failure accidents can be prevented. This is the desired end result.

Business Aircraft To Gain From Airport Subsidized By Federal Aid Program

New York's Gov. Averell Harriman officiated at the groundbreaking ceremony for Olean, N. Y.'s new Municipal Airport, on June 30. Part of the Federal Airport Aid Program, the new airport will cost $1,500,000; will service private and business aircraft, but will be designed for commercial operations as well. The airport, which now has two runways one 5,000′ paved, NE-SW; one 2,500′ turf, NW-SE, will open its expanded facilities July 1, 1958.

At ground breaking ceremony for Olean, N. Y. Municipal Airport, Gov. Averell Harriman sits in the driver's seat of an earth mover, while Mayor Ivers J. Norton stands on the steps. L. to R. are former Olean Mayor Fred J. Forness and Olean Chamber of Commerce Pres., J. M. A. van der Horst.



Extra Value makes the difference in Aviation Insurance

The Scott Paper Company plane, insured by North America

Standard clauses in aviation policies make all insurance seem the same. Below the surface there are differences worth considering. North America Companies' differences stem from the extra value furnished with the policy.

North America, as the leading independent underwriter of private plane insurance, has the *Capacity* to meet any underwriting need. It has *Coverage*, plus the pioneer spirit it takes to adapt policies to situations. In *Service* North America, the leading independent insurer, is free to develop beyond standard accommodations. Its 102 claims offices provide quick processing of claims. Any of its 20,000 agents can quickly get a North America aviation specialist—one of its own—to your side. Periodic inspection of craft is a valuable safety feature available to our policyholders without charge.

All these features come to you through a North America agent or broker, an independent businessman. They are the distinctive features that give North America insurance its extra value.

INSURANCE BY NORTH AMERICA

INA 1792

PHILADELPHIA

Insurance Company of North America • Indemnity Insurance Company of North America
Philadelphia Fire and Marine Insurance Company • Life Insurance Company of North America

Round Table

(*Continued from page* 15)

and I mean *check* them not just move them.

"The DC-3 with the switched pulleys would never have been sent rolling down the runway if the pilot had checked the direction of the aileron travel in relation to the movement of the control wheel.

"You can patronize the maintenance organizations that have completely separate maintenance and inspection, and have established adequate maintenance standards and procedures. Finally, if you should discover a part installed incorrectly, you can tell the people who are in a position to do something about the next design. You can tell the C.A.A., you can tell the airframe or engine manufacturer, the dealer and the distributor and the Flight Safety Foundation. Your report will be a contribution to flying safety because it will reduce the opportunity for design that sets the stage for Murphy's law.

". . . The problem of bogus parts is a very serious one. First it can endanger your flight operations. A friend of ours was having his mechanics install new bolts in a wing attack angle of his DC-3. When three of the bolts broke under the prescribed torque, he had them tested. *Not one of them was heat-treated,* all were bogus and bootleg bolts on which someone made an illicit profit. Secondly, the airworthiness certificate of your airplane may be suspended or revoked if bogus parts are used in its repair, overhaul, or maintenance.

"The C.A.A. has served notice to this effect in a sincere effort to stamp out this evil. Many of the parts on the market today are not only of inferior quality and undetermined material but they are clever counterfeits of authentic parts. They're marked with the parts numbers of the genuine article, even packaged like the original. It is often difficult if not impossible to detect they are bogus without extensive tests that few of us are equipped to make.

"The C.A.A. has come up with some guides to help determine if the parts are genuine, and have approval tag Form ACA No. 186 signed by the C.A.A. representative of the source of manufacture. But if the parts themselves can be counterfeited, approval tags and signatures can be forged; so this leaves you very little choice except to be sure of your source of supply.

"I urge you to buy replacement parts from the prime manufacturer, from his dealer or distributor, or a reputable maintenance agency. These people are responsible members of the industry, they will serve you honestly and in your best interests. So let them protect you against the threat of bogus parts."

K. R. Duee, Safe Flight Instrument Corporation discussed emergency operational procedures.

". . . Unlike aircraft certified under Part 04B for air carrier, the amount of information for best single-engine emergency operation of the new 'light-twins' is scant. In airline operation, the Captain has at his fingertips a wealth of flight test data, graphs and tables concerning the operation of his airplane under various configurations, weights, altitudes, temperature, etc., for extracting the best engine-out performance from his aircraft.

"In contrast to this, a pilot of the light-twins may only be given one or more single-engine speeds in its operation manual. There's a compromise between what may be an excessive requirement of some bulky single-engine operating manuals and the over-simplification of the mere presentation of some single-engine speeds.

"First, there is more than one best single-engine speed. The best single-engine speed for take-off, enroute climb, ceiling, and landing approach would normally vary and would also individually change with the airplane's weight.

"Since the take-off technique is not prescribed by regulation, the exact manner in which these speeds are applied is rather vague. For instance, if a manual gives a speed as the minimum single-engine control speed and then later refers to this same speed as a take-off minimum the question arises as to where is the factor of safety. In transport category terminology, minimum control speed is the speed with which full rudder control deflection is required to maintain straight flight. It is never usable as there would be no controllability remaining whatsoever. A take-off speed of at least 10% higher is required to provide a minimum of controllability.

". . . We could call this increased speed, the minimum safe single-engine take-off speed. It would be good if the manufacturers clarified the manuals as to whether a *safety margin is included* in this minimum single-engine control speed or not. Best *obstacle clearance* is usually obtained by maintaining the minimum safe single-engine speed until take-off obstacles have been cleared.

"Actually a better *rate of climb* might be achieved at higher speeds, but at a considerable sacrifice in horizontal distance traversed, especially with the slow single-engine acceleration. These higher optimum single-engine speeds are also associated with a clean configuration, gear up and dead-engine feathered. All of this speaks against any attempt to clear a critical take-off obstacle in a single-engine emergency at any other than the minimum safe single-engine take-off speed.

"Pilots should familiarize themselves with their airplane's best single-engine climb and ceiling. In order to determine this best speed, perform the following tests under single-engine route conditions. Select a minimum of four airspeeds each, five knots apart and hold each of these speeds until the rate

of climb is steady, and record these rates of climb.

". . . It is recommended that the pilot not only be familiar with speed for best single-engine rate of climb but also to impress upon himself the climb performance at speeds higher than this. Even though the rate of climb will fall off again at a higher speed it will do this more gradually than at the lower speeds. What that sentence means is that you can get almost the same rate of climb at a higher speed.

"On the other hand, engine cooling and range *will be improved* on the higher speed side and these may be important factors to the safety of the single-engine flight.

"To do the above under con-emergency conditions is important. During an actual emergency, there may not be time or opportunity to seek the best speed by trial and error.

". . . At the lower powers used in landing approach, the sudden unbalanced control forces caused by losing an engine become greatly diminished. The area of caution here is to avoid the requirement of full power to get back up to the desired glide path if the airplane is inadvertently allowed to descend too far below it. Flaps change the minimum single-engine control speed. In the event of a single-engine go-around, it is important that flaps be moved to take-off position at once. It is better to lose more altitude *initially* in getting the flaps set properly and the plane cleaned up for single-engine climb configuration and speed than to prolong this inefficient condition and gradually lose altitude. Flap retraction at low air speed *should be practiced* in order to coordinate the proper elevator action as the flaps come up. It is not necessary to use single-engine operation during this practice and the measure of skill that the pilot should use for this maneuver should be his ability to lose the minimum amount of altitude during this maneuver.

"Another approach to this problem of the effect of flaps on single-engine operation that has been selected by skilled operators is to *avoid the use of flap deflections greater than that* for take-off until the landing is made. This procedure involves the use of higher approach speeds and a more rapid bleed-off of speed at low power during the final moments before landing simultaneously with full flap deflection. This has the disadvantage of making the approach gymnastics more complicated with rapid changes in pitch trim, with low power settings which increases stall speeds and flap ballooning which can cause a tendency to over-shoot or even to return the airplane into a low ceiling.

"All single-engine optimum operating speeds are affected by the aircraft's weight. A convenient rule of thumb for the pilot to use is to vary these speeds half as many percentage points as the gross weight varies. For example, if the pilot determines that his best single-engine ceiling speed is 90 knots under conditions where he is flying at 80%

of his gross weight then he should change to 95 knots at 90% of his gross weight.

"Two engines have twice the opportunity of having an engine failure as compared to one engine. Loss of control or performance during single-engine emergencies defeats multi-engine safety. By keeping the principles just discussed in mind, the full safety of multi-engine operation can be achieved."

John Wilson, CAA, New York Center, discussed air traffic control problems and procedures:

". . . The traffic control problem in general is one, at this time, of expansion and improvement. The specific problem in the New York area and Long Island lies roughly within the perimeter Bridgeport, White Plains, Poughkeepsie, Binghamton, Philipsburg, Harrisburg, etc., plus halfway across the Atlantic Ocean. This area, including the Reading area, is the most congested airspace in the United States, which I presume means the most congested airspace in the world.

". . . There are no back roads in the air around here anymore. The phrase "off airways" is just about as obsolete as "23 Skidoo." As long as there isn't much traffic you can afford to have traffic going in opposite directions. We have long since passed that stage and in order to move the traffic at all, we had to develop single direction airways.

"For this reason we have also established preferential routes. If you are going from New York to Chicago, you are going one route. Even if you don't file that route, you get cleared that way *except* for reasons of safety. If there are severe thunderstorms or inoperative navigation facilities along the preferential routes we will, of course, approve a different way; but normally in the absence of those conditions we will clear you by the preferential route.

". . . We publish a Preferential Route bulletin which we try to keep current. If any of you are not familiar with it, and would like a copy, you can write the Chief Controller, New York Center at Idlewild. We'll be happy to send you one. A portion of this document, the outbound preferential routes, is now published in the Airman's Guide regularly.

"As another aid to handling this vast volume of traffic we have established peripheral communications, that is, direct VHF communications between the pilot and the Controller at the Center with instantaneous transmissions through remote transmitting and receiving sites. For example, we have the transmitting and receiving equipment located at Big Flat, Elk Mt., at Philipsburg and at various places throughout our area which gives us complete VHF coverage throughout the area. We publish frequency coverage charts which roughly show the New York Air Traffic Control area with the frequencies we operate for control within the areas that we operate; these also are available. We request that you do not contact the Center on any of the Center frequencies unless you have been specifically cleared to do so because they are used for control purposes. For communications we prefer you to use the regular communications channel.

". . . We now have a development called RAFAX, whereby we can pipe in the local radar picture from the local Metropolitan towers into the Center and display it in conjunction with our long-range radar and use the two of them simultaneously. (See "Radar Pictures Relayed by Telephone" in this issue, NAVICOM section.)

". . . The thing that throws a bigger curve into our operation probably more than anything else is to lose communications with a small aircraft coming into the area on an IFR flight plan, or find that the pilot becomes uncertain with the station. As a result we have to stop all the traffic in the Metropolitan area and block the altitude that he's at. If he's at a 5,000-foot or lower altitude, we may have to shut off departures and arrivals at Idlewild Airport and LaGuardia for the length of time that it takes to find him and get him back on course and oriented. If you are not well-equipped to fly IFR and are not thoroughly experienced and if you haven't done a thorough job of flight planning, I would suggest you do not contemplate flying in the New York Metropolitan area; this is really not a place for practice.

". . . If you are on an IFR flight plan and you have filed a certain altitude and we delay or hold you, or change your altitude, don't get the idea that this Controller has a grudge against you or that he's against private pilots. I have heard from our airline pilots that we favor the military, and I've heard from the military that we favor the airlines and I've heard from both of them that we favor the civil pilots. When you are given a VFR restriction on an IFR clearance, be aware that the only separation you are being provided from other traffic is what you are going to provide yourself. If you are not able to do it yourself, tell the Controller you're not and he'll give you a different clearance. If you are planning a change in flight plan from a VFR to an IFR in the New York Metropolitan area, give us time. Don't call in and say, 'VFR, I want an IFR clearance, and if you don't give it to me I'm going to be on instruments in the next thirty or forty seconds'; it takes time. Whether you plan to go visually or not, file a flight plan."

Art Graham, of LaGuardia Tower, suggested easier A.T.C. handling in high-density areas.

". . . Maximum utilization (of runways and airport facilities) is a must. When getting on and off a high-density airport with traffic congestion, there'll be very little "slack" if the controller and the pilot are on the ball. When you have aircraft of different approach speeds and handling characteristics, it's going to be quite a problem for the controller to know and try to judge his control actions and instructions in terms of the performance of the airplane.

". . . We have to assume that the pilot is alert, is competent, is sharp, wants to get going and won't waste any time; and that he's right up to the minute on the available facilities, and conditions that we're up against. We should be able to close down to the theoretical minimum safe intervals and get more people in and out with safety. That requires such things as speed control in the pattern. It doesn't do you any good coming up to high-density airports on a day of heavy traffic, with everyone trying to get down at the same time, then suddenly find out you must circle fifteen or twenty miles out simply because we've got too many airplanes around.

If you're inbound—and listening to Approach Control while still 15 or 20 minutes out, you'll soon get the idea what's going on and what the situation is. You can slow up then, and by the time you check over Approach Control, you will already know the wind direction, velocity, the landing runway, the various other conditions, and any other things we have to give you which take up radio time. You can check in then and tell us that you have that kind of information; you've heard from where you are that the fellow before you was instructed to call the tower at a specific place; that you'll call from that place. You'll save us a lot of time on the radio, time that we can give to assigning sequence and the handling of more aircraft.

". . . We do expect you to be able to handle a certain amount of crosswind if that's the preferential runway in use. Suppose we have traffic landing on 31 at LaGuardia, a wind velocity and direction that will be usable for conventional or tricycle gear aircraft, and because the wind isn't right down the runway, they ask for another runway. We have to double or triple the separation. That isn't good; that slows things up. If you think the situation is unsafe, you can have it. Abide by the preferential rules and it'll go a long way toward keeping the neighborhood happy; it will expedite traffic. When you're on the ground, you can clear that active runway as rapidly as practicable, follow the traffic flow, and get over on Ground Control as soon as you're clear without having to be told. Again you're doing a professional job and that helps.

"Now you're outbound and you run into one of those long delays. If there's an alternate runway that looks acceptable to you, give us a call; if we can use it with safe separation and without violating any good procedures, we'll be glad to give it to you. You're the best judge of what you can handle. Suppose you're stuck in a lineup behind two or three large four-engine aircraft and they're not ready to go. Maybe they haven't gotten their ATC or something like that. Let us know you're ready—if it looks like you can get the runway. Nothing is accomplished if you sit there, number four or five, and tell us you're ready to go, possibly breaking up a transmission or a clearance or something, and then, when we query you, you say you can't get to the runway.

"Same thing if you're outbound. You've got a take-off; you know that we've got somebody that's waiting to go behind you, maybe a bigger, faster airplane. You're listening on a frequency, you've heard us clear him into position prepared for an immediate take-off. You don't want the hair on the back of your neck curling, so as soon as you think it's safe to make a turn, request to make a turnout. If it's a left turn you don't need a request. It's clear the take-off path because we'll start that Six or Seven rolling.

"Meanwhile there might be someone on final and he's counting on that plane rolling and we're counting on it rolling and nobody likes a go-around; nobody's happy.

"The major thing in making Maximum Utilization of runways and paved surfaces at a high-density airport is sharpness on both the part of the pilot and the controller—professional handling. I'm sure that even the business pilots who are not necessarily flying for hire but are flying for business have every desire to operate at a professional level and a professional standard, and feel that they do. We love a man who knows his frequencies, knows his radio, his navigation, and knows that he knows it by prompt, adequate handling.

". . . On the question of low-altitude control, most of the New England area, the Pennsylvania, Ohio Industrial complex and the Piedmont areas are covered by this Low Altitude Control (LAC) tower enroute control. The gaps in the system such as the Philadelphia-Newark and the Westchester-Bradley links and certain links in the Indiana area are expected to be filled very shortly. They are only waiting on equipment, telephone land lines, etc.

"You save a lot if you use this Low Altitude Control. You are not subject to competition with the long-range over-traffic for route availability; you are not exposed in many instances to freezing-level altitudes, and often the altitudes available are optimum for thunderstorm conditions.

"*Cautions:* The compass locator station formerly located at Flatbush has been removed to the Idlewild decommissioned low frequency range. A few exciting moments have been known to result from an aircraft cleared via Flatbush on radar, homing merrily through a Scotland holding pattern through Idlewild. Watch out for changes in the New York and other high density areas.

"The familiar old Newark low frequency range, 341 kilocycles, will not be at home at that address after August 1st. *Check your charts.*

"We are not doing these things to confuse you and make your job tougher and more interesting. These changes will improve conditions in the area. The flow of traffic will be eased and you will benefit along with all other pilots.

"When you see the visibility getting low on the New York area sequences, begin your planning right away for the possibility of an instrument operation. Surface visibility reported as three or four miles at LaGuardia almost invariably means lower visibilities aloft at approach altitudes."

(Note: Low altitude system charts of the Northeastern United States are available from Mr. Graham at the LaGuardia Tower.)

Safe Flight Instrument Corp. Appoints Reading Aviation Service Distributor

Reading Aviation Service, Reading, Penna., has been appointed a distributor and major installation center for Safe Flight Instrument Corp.'s Autopower System. Autopower System automatically provides the engine thrust necessary to meet an airspeed and winglift condition selected by the pilot for every visual or instrument approach to a landing; also assures a positive speed margin of safety for the aircraft in any configuration and with any gross load. Total weight of Autopower is only 35 pounds.

Everest Walks Away With Chanute Award

The winner of the 1957 Octave Chanute Award for "outstanding contributions to the development of rocket-powered flight test techniques" was Air Force Lt. Col. Frank K. Everest, who was the first man to fly the Bell X-2 rocket research plane. His fastest published speed was 1900 mph.

Dusters Graduate

The first course at Davis, (University of California) and Davis Airport graduated 5 aerial applicators. They were Stewart Kunke, Ralph Scheutz, Jack Mackeds, Fred Phelps, and Robert Maxwell. All received from 23 to 25 hours in the air and a full ground school course.

A RECORD NUMBER OF 150, *almost all pilots, attended the 4th Annual Spokane Pilots Clinic recently, sponsored by the Spokane Businessmens Pilots Assn. and the Av. Comm. of the Spokane Chamber of Commerce. Highlights of the clinic included the showing of new AOPA film "To Save a Life" which shows how a pilot without instrument training can execute a 180-degree turn to get out of bad weather; radio communications practical training on a mock-up of Geiger Field made available by the 142nd Fighter Wing, Washington Air National Guard.*

OX5 CLUB

OF AMERICA

By RUSS BRINKLEY, PRES.

The national convention of the OX5 Club, at Kansas City, on September 7, 1957, will mark the second anniversary of one aviation organization, destined for popular acceptance from the day of its founding. Never before has an aviation group expanded so rapidly or become so well known as has this band of pioneers, who earned their wings in the stick-and-wire days of aviation. The phenomenal rise of the OX5 club has been attributed to many things but those who head the organization will insist that the personal interest of individual members is responsible.

When the true history of the OX5 Club is written, an admission must be included that the group was primarily formed as an excuse for a handful of Pennsylvania flyers to get together on occasion, to toast the so-called good old days of aviation. Little did the founding group expect that, on the day the club was organized, men with similar interest would drift in from other states, to prove their eligibility for membership.

The idea of an OX5 club did not originate with the founders of the present fraternity of pioneers. Over a period of years, the need for such an organization had been considered by many airmen. Very little was done about it until July 1955 when I was seeking a publicity angle to advertise the first Pennsylvania State aviation reunion to be held at the Latrobe Airport. Charles B. Carroll, for 35 years the proprietor of the field mentioned that a mutual friend, Sam Bigony of Pottstown, had stopped off during a cross-country flight, and brought up the long-neglected subject for the need of an OX5 Club.

Two hours later, newspapers and radio stations of Pennsylvania were proclaiming that the highlight of the forthcoming aviation reunion would be the organization of an OX5 Club, with membership open to everyone who won

(*Continued on page 55*)

Grumman Aircraft Develops Turbo-Prop Executive Transport

"Design 159," a pressurized turbo-prop company transport aircraft for "modern businessmen," is being developed by Grumman Aircraft Engineering Corp. Powered by two Rolls Royce Dart turbo-prop engines, the new executive plane will cruise at a maximum speed of 370 mph at 25,000 feet; will carry 12 passengers. The "159," which marks Grumman's re-entry into the commercial airplane market, is capable of operation from runways under 4000 feet long with full load, has a maximum range of 2200 miles, plus customary "hold" and alternate airport requirements. Designed to provide for today's most advanced electronic and communications equipment, as well as for future devices, the "159" has a gross weight of 31,000 lbs, a wing span of 78 feet, and an overall length of 64 feet.

A feature of the new transport plane is the location of the doorway and a self-contained stairway just aft of the cockpit. As a result, the plane is completely independent of ground handling equipment, and the pilot completely controls all loading operations. The airplane will be available in various interior arrangements, including a high density version carrying a maximum of 20 passengers. It will be certified under category 4b government airliner regulations and will undergo a rigorous flight test program. The first "159" is due off the production line in May 1958.

New Interplant Executive Transport For Burlington Industries—Bell Ranger 47 J Helicopter

Burlington Industries Inc., the nation's biggest textile producer, now uses a Bell 47J helicopter as a sleek interplant executive transport.

The decision to buy a four-place Bell helicopter was made by Board Chairman and President Spencer Love only after the helicopter proved its time-saving abilities in a desk-to-desk travel-time study.

With 30 plants scattered within a 90-mile radius of Burlington's main office at Greensboro, N. C., the executive helicopter was a natural solution for the transportation problems of the company's top 25 officers. In every case the Bell helicopter saved time, varying from 20 minutes to nearly five hours.

For example, one-way trips between Burlington Industries' plant at Asheville and the Greensboro office consume six hours on the ground. The Bell RANGER clips four hours and 40 minutes off the same journey. This single application of helicopter's front door service results in a sizable saving.

Previously, officers of the company could not drive to the Asheville plant, conduct their business and return to the home office in a day's time. The introduction of the helicopter enables the round trip travel time to be reduced from 12 hours to three hours and 20 minutes, leaving ample working hours both at Asheville and Greensboro.

When the salaries of the executive passengers are figured and the executive

working hours salvaged by using interplant helicopter transportation are multiplied by three—the passenger carrying capacity of the RANGER—the dollars and cents savings are most significant.

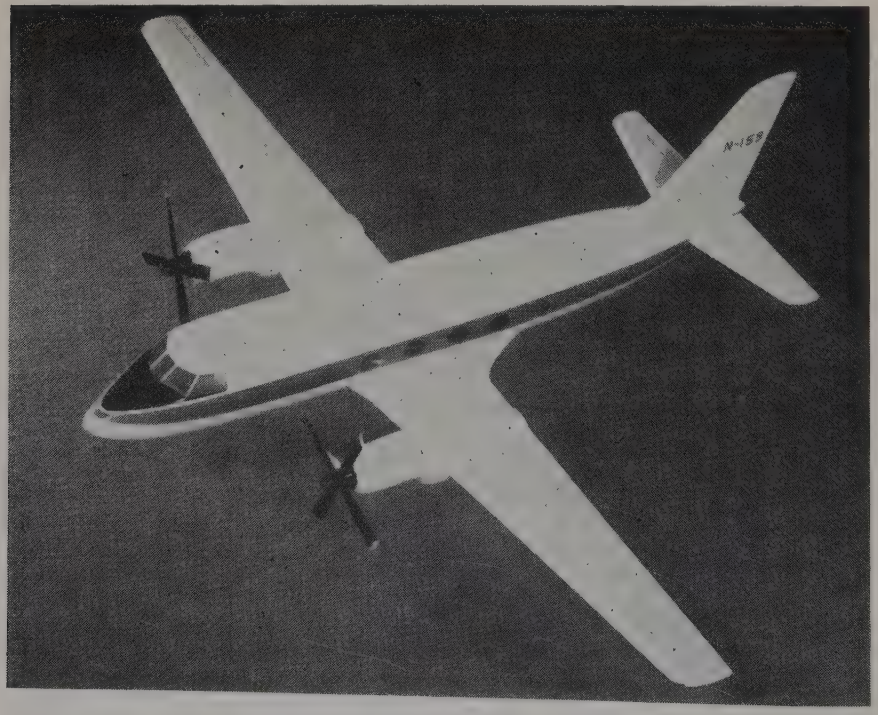
According to Burlington's Chief Pilot Shelby Maxwell, who completed the Bell factory training course along with pilot Bill Lewis and mechanic Bill Sharp, the 47J will fly at least 30 hours a month. After the helicopter has been on duty for awhile, however, Maxwell predicts that other uses will be found for the versatile machine.

Currently the company helicopter operates from ground heliports, conveniently located near the front doors of the various plants. Future plans include the possible installation of a rooftop heliport on Burlington Industries' two-story main office building in downtown Greensboro.

The helicopter is equipped with a deluxe passenger interior of green upholstered fabric, green carpet and white leather trim; rotor brake; night flying equipment; heater; radio; and a custom exterior paint style of white with a desert tan stripe accented by a brown outline pin stripe.

Besides the new Bell 47J Burlington Industries owns and operates six other aircraft, ranging from a DC-3 to a small Apache. In its class, however, Maxwell feels certain that nothing can compete with the door-to-door service offered by the rotary-wing Pegasus.

Maxwell is a veteran fixed-wing pilot with more than 12,000 hours and 27 years of flight experience to his credit. In 1956 he received an NBAA award for



MODEL *of Grumman Aircraft's new "Design 159," an executive transport "designed specifically for modern businessmen." The new airplane, powered by two Rolls Royce Dart turbo-prop engines, marks Grumman's re-entry into the civilian-commercial aircraft market.*

having the second highest number of accident-free miles flown of all business aircraft pilots.

Hertz-Rent-A-Plane Plan To Augment Business Fleets

The recent announcement of the Hertz Rent-A-Plane plan is likely to have a good deal of meaning to many business plane operators.

While the major emphasis of this plan is being set up by Hertz and Cessna, it is aimed at the individual businessman pilot who has need for an airplane, but perhaps not enough need to justify sole ownership.

This new service, which will be available in the fall on a nationwide scale, will also provide supplementary service, useful to many corporations operating their own aircraft.

It is often difficult for the corporate Flight Department to have the right airplane in the right place at the right time. This is a greater problem for the corporate operator with the small fleet.

Neither Hertz nor Cessna believes that this new plan will be any substitute for the well-run, company-controlled and-operated fleet. But many corporate fleet operators will find that the availability of extra airplanes on a rental or charter basis will solve a "sticky" problem.

The cost of such short-time rentals will obviously represent a substantial saving compared with trying to maintain more equipment for occasional "peak" loads.

HERTZ CORP. *Inaugurates First National Rent-A-Plane Service. Walter L. Jacobs (right), president of The Hertz Corporation, and James Herrick, fleet sales research manager of Cessna Aircraft Company, discuss plans of the newly-formed Hertz subsidiary, Hertz Rent A Plane System, Inc. Hertz Rent A Plane System will issue licenses to selected Cessna dealers to conduct plane rental operations. Herrick is seated in a Cessna Model 172, a type of plane Hertz will rent on both a "fly yourself" and charter basis. Service is to be inaugurated next fall with 50 Rent-A-Plane stations planned.*

Many corporate fleets are largely made up of big airplanes. Initially the equipment in the Hertz program will be single-engined Cessna 172's and 182's and the Cessna 310 light-twin. While this may not serve the need for supplementary aircraft of big capacity, for a convention meeting for example, it will, on many other occasions, be just what is required.

Often the "schedule conflicts" presently encountered could be quickly solved with either a light-twin or a single-engine airplane to take one, two or three people in one dirction while the big corporate aircraft is engaged in a major task in another direction. In this sort of a situation this new service should find good acceptance.

Hertz plans to develop this phase of the rental market and believes, in the long run, it can be a major factor in the success of the plan.

Western Region Traffic Men Meet in Seattle

Members of the Western Region Traffic committee of the Aircraft Industries Assn. met in Seattle last month. Harry Brashear, secretary of the association's traffic committee presided.

Conference covered freight rates, Interstate Commerce Commission decisions and transportation problems.

Navicom

(*Continued from page* 27)

the device feasible, is a rapid film processor. The fast developing machine is an integral part of the radar strip recorder. Utilizing a monobath solution operating at high temperature (130°F), the rapid processor produces a completely developed film in ten seconds. The developed film is ready to view in strong light.

Combination of the electronic circuitry which couples almost any radar set to a precise optical-mechanical system with the unique monobath film-developing machine results in a radar strip recorder which is equally useful in the air or on the ground.

In ground applications, the strip recorder receives information from an airplane or missile via radio waves. This information is then immediately recorded on photographic film, and is ready for viewing twenty seconds later. A permanent record of the flight path of a missile reconnaissance radar information of friendly or enemy territory, or any other type of data transmitted from the airborne vehicle can be used immediately or stored for later evaluation.

Separated from the electronics built into initial models of the recorder, the film processing portion of the device is applicable to rapid processing of many types of data which can be fed into the optical system by either mechanical, optical, or electrical means. Civilian and military telemetering systems are expected to utilize the rapid, permanent readout features of the processor. Also, electronic computers can make efficient use of the up-to-the-minute, yet permanent recording characteristics of the machine.

Precision electronics and optics, combined with utility and practical application have been stressed in the development of the radar strip recorder.

Application of established land-line picture transmission techniques and airborne beacon radar identification to this process could supply interested parties such as airline operations offices with visual monitor of their flights, also copies of weather system movements to numerous locations now lacking radar.

Radar Pictures Relayed By Telephone

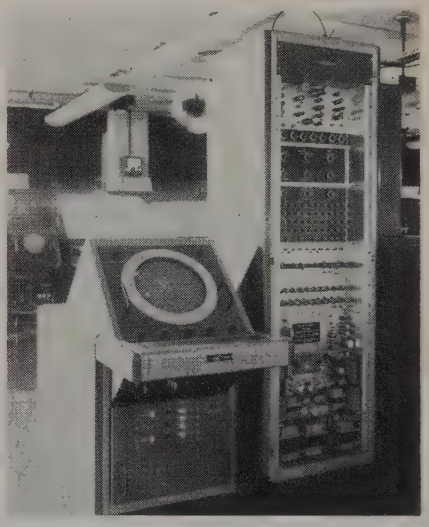
A new radar facsimile called RAFAX has been installed at the Traffic Control Center, Idlewild Airport, for experimentation.

Manufactured by Haller, Raymond and Brown, Inc., of State College, Penna., a Division of Topp Industries, Inc., California, Rafax is a system of transmitting radar pictures by telephone from remote radar stations to the control center. After transmission over such a circuit, the 'picture' (signals) is used to recreate a facsimile of the original radar picture. The advantages will be more complete control of traffic at greater distances without building relay antennas, waiting until planes come within thirty miles of the airport, and extending the control center's vision.

RAFAX eliminates blind spots, excessive ground clutter and will transmit in rough country with either coaxial or microwave radar systems. Although the density of the targets as shown on the screen are less, there is no loss of the target.

The system has undergone equipment evaluation tests by the CAA for the past year at the Indianapolis Technical Development Center and has been operating experimentally twenty-four hours daily at Idlewild. In addition, it is now remoting local radar information from La Guardia Airport to Idlewild. This will extend the radar vision of the Idlewild Traffic Control Center by combining its own local radar displays with those from La Guardia radar.

As Dr. John L. McLucas, President of Haller, Raymond and Brown says: "The problems of air traffic control are not yet completely solved, but RAFAX



is going a long way toward providing low-cost radar remoting, which in turn provides control centers with needed information to utilize effectively the now crowded airspace."

Principal units of the RAFAX system: Decoder, Indicator, and Encoder. These permit the transmission of PPI type radar information over audio circuits such as telephone lines or radio links. Result is a facsimile of the original radar picture. Bandwidth compression is accomplished by means of an optical-electronic scanning device which is capable of giving compression ratios of 100 or greater.

Coast Guard Drills For Pilots

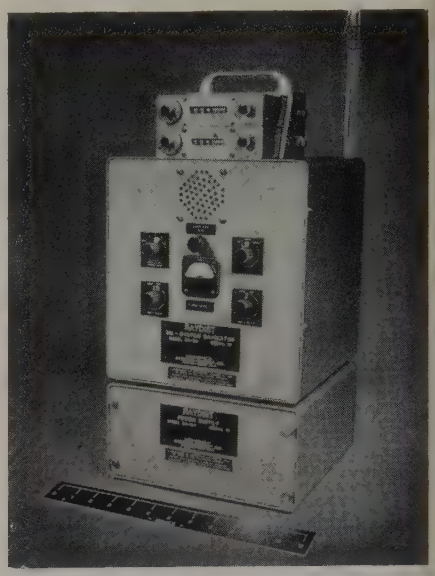
The U. S. Coast Guard holds periodic drills for airline personnel. Any executive pilot who anticipates a flight overwater can attend one of the drill sessions to learn something about ditching procedures and emergency facilities of the Coast Guard.

Floyd Bennett Shoos Sea Gulls

Latest wrinkle to chase sea gulls from the airport comes from Floyd Bennett: They drive a jeep down the runway, playing a tape recording of frightened gulls!

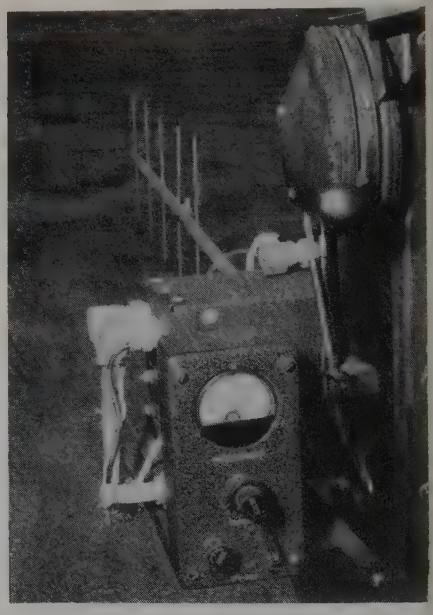
New Aids for 'Copter Off-Shore Navigation Shown

Two devices designed to facilitate off-shore navigation of working helicopters have made their appearance. Stressing light weight, portability and reliability under conditions where other



electronic aids fall down, both merit examination.

A major part of the oil industry and helicopter operators in the U. S. and Canada are currently flight testing the



Helihomer, a new homing device now being manufactured by Clover Field Radio Supply Co., Santa Monica, California.

The Helihomer was conceived slightly more than a year ago by two helicopter pilots who were convinced much of the risk of off-shore operations could be eliminated. The men, Executive Vice President Frank H. (Bud) Kelley of Hawk Helicopters, Fort Worth, and Magnolia Petroleum Company's chief pilot, Sam Willis, called in Vernon H. McCullough of Clover Field to translate their idea into equipment.

In August, 1956, after working with

the problem for six months, McCullough brought his prototype Helihomer to Texas. Willis promptly had it installed in one of Magnolia's Bell copters, and Kelley and his Hawks pioneered the initial tests. By November, the FCC had authorized use of frequencies 460 to 470 mc in the ultra high frequency range.

Strength of the UHF signal helped, distilling interference from lightning and also man-made disturbances, e.g., from power plants, generators, et al.

The first tests were termed successful. Kelley and Willis then anticipated another possible problem: the economic factor. Original design had called for the transmitter to be installed on the off-shore rigs, which sent out a signal a helicopter pilot could home in on. A company operating as many as a dozen rigs and requiring as many transmitters might not want to pay the freight, at $1500 per unit.

McCullough's adaptation of the Yagi directional antenna—which resembles a large T crossed five times—held an inherent solution to the problem. The conventional Yagi sends out signals in a circular pattern of loops. McCullough had nulled out all but one of the loops and two small ones projecting at 90° angles from the point of emanation. Kelley and Willis adapted the system by mounting a rearward facing antenna on the test helicopter and installing the transmitter ashore. Bearings of the off-shore rigs remain static, therefore to home in on a rig it was necessary only to point the Yagi on the proper bearing, enabling the helicopter to home in on the signal's track to the point of interception.

Getting from one rig to another was as simple. Shore-based transmitter issues signal on new bearing, and the helicopter flies a circuitous course until the signal is picked up and then homes in on it.

Returning to shore, the helicopter pilot merely has to switch over to the forward antenna.

Hawk Helicopters has three Helihomers, uses one on its off-shore operations, marshaled from Lafayette, Louisiana. Magnolia has another, has been using it for four months. Says Willis: "It works perfectly."

Thus far, Bell Helicopter Corp., Fort Worth, Bell's dealers from France and Venezuela, a U.S. Army observer, Spartan Air Services, Ottawa, Stanolind and Sun Oil, and Texas Gulf Sulphur of Houston have been noting the Helihomer demonstrations.

Package installation of base station transmitter and antenna is priced at $1,500. System hooks into 110 volts AC. Helicopter installation, including receiver, dynamo (24 volt system) and two antennas, completely installed and ready to go, runs $1,495.

Hastings-Raydist, Inc., Hampton, Va., offers their new miniaturized Raydist Position Indicator (Navigator) aimed at the many applications requiring light, portable units. Specifically designed for use in helicopters, light planes and even for *man-packed* applications, this new Navigator is packaged as four separate units but mounted in one case, complete with battery unit (optional), whip antenna, and handle for easy carrying.

Two small indicator units (shown top center—weight less than 2 lbs) furnish accurate position data with respect to corresponding shore or base stations. The center cabinet, weight 16 lbs, contains all electronic circuitry. Lower cabinet (power supply) contains dry-cell batteries sufficient for 17 hrs of operation. Battery supply weighs 20 lbs and is not necessary where a 24-volt d-c source is obtainable.

On rear of case is a collapsible whip antenna and also provision for attachment to external antenna when used in helicopters, aircraft or other vehicles. Operating entirely with transistors, these new Raydist Navigators are particularly free of effects of interference and incorporate *an inertial system* to extrapolate position through periods of interference or signal interruption.

These new devices are particularly valuable with the newest type DM (Distance Measuring) System, which gives the position of a ship, vehicle or aircraft directly in terms of two distances to light and easily installed shore stations. Distance measurements are presented directly on counters, which may be removed for remote observation. Accuracies in distance measurements range from one part in 5,000 to one part in 50,000, depending on the type of installation, the ranges of operation, and the techniques of data handling.

This line of lightweight indicators offers a neat and practical solution to the helicopter navigation problem and simultaneously will find greater use in the aerial and ground surveying fields.

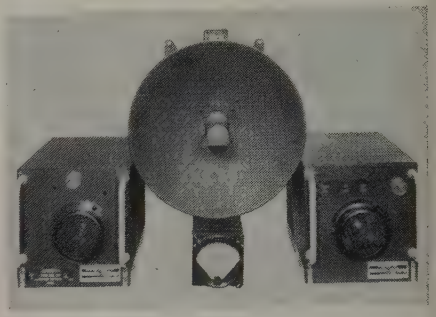
RCA Demonstrates New Weather-Radar For 'Small' Aircraft

A lightweight radar system designed for small business, private and commercial twins according to Arthur L. Malcarney, Executive Vice President, RCA Defense Electronic Products, is the smallest and lightest weather-radar of its type so far developed. The compact system (AVQ-50) weighs only fifty pounds, yet enables pilots to "see" and avoid storms up to eighty miles ahead. (Ed. Note: An engineering model of the system was shown for the first time late last year at the National Business Aircraft Association Meeting in Miami.

In-flight demonstrations of the AVQ-50 system were made with a radar-equipped RCA aircraft which visited eleven cities from New York to Los Angeles during June.

The fifty-pound radar is RCA's second weather-warning radar system developed for commercial aircraft. The company has been producing for some time a weather-penetration radar system (AVQ-10) for larger and faster aircraft. This enables pilots to "see" storms and cloud formations up to 150 miles ahead, and to chart smooth routes through turbulent areas. The AVQ-10 weather-penetration system is used by six American and thirteen foreign commercial airlines, the Royal Australian Air Force, and numerous large industrial and private aircraft.

Similar in general operation to the AVQ-10, the new RCA weather-avoidance system has a nose-mounted antenna to pick up storm formations ahead. The storm picture is projected on a radarscope mounted in the aircraft's cabin or cockpit. The system also features circuitry which enables the pilot to switch-in a close-up view

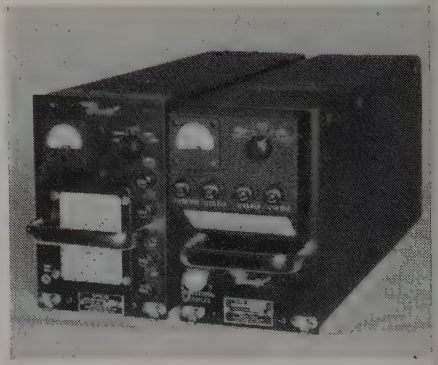


Major components of RCA's 50-lb. AVQ-50 Weather Avoidance Radar. System enables pilots to "see" and avoid storms up to eighty miles ahead.

of a given weather-area ahead, and provides a special antenna tilt-control to permit use of the AVQ-50 radar for terrain mapping.

(Ed. Note:—50 lbs is about 10 gals of gas. We wonder what the market would be for such a radar for the thousands of single-engine business aircraft, employing a wing-mounted radome similar to that of the WW II single-engine night fighter? Eh?)

Bendix is also offering a "lightweight" system (see cut). Weight is quoted at 47 lbs not including antenna, cabling or indicator.



BALTIMORE—A new lightweight airborne weather radar transmitter-receiver that weighs only 26 pounds, but still retains all of the basic features of the present airline-type equipment. The new 150-mile range, X-band unit is shown (left) with the 21-pound synchronizer-power supply introduced in 1956.

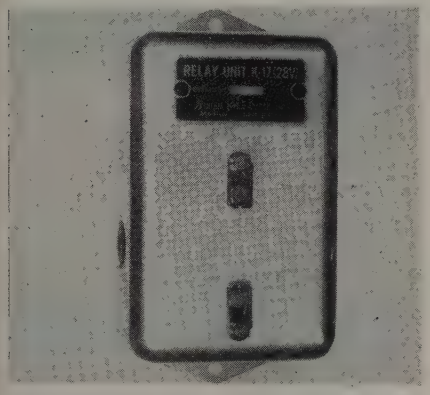
Did you know that the wonderful Dizzy-Three cost $125,000 new as opposed to a four-engine jet which will be price-tagged at about $5,000,000?

New Relay Packages Simplify Electronic Installations

Modern electronic installations in aircraft often require an assortment of relays to perform switching operations made necessary by the large number of equipments. ARC has "packaged" three types of its much-used designs into boxes in such a way that the installer need not manufacture his own special mountings, connectors, and protective housings.

Designed for use on a variety of types and makes of aircraft navigational and communications electronic gear, including ARC units, the packaged relays are for low voltage, low current switching and low voltage, high current (10 amperes) switching. Known as the ARC Type K-15, K-16, and K-17 Relays, the packaged units are accompanied by single sheet installation instructions.

They are designed for two-hole mounting on walls or shelves in the radio compartment where provision is made for holes protected by grommets for access by the connecting leads. A terminal block inside the casing of each



type of packaged relay makes possible the assembly of the unit in the aircraft without endangering the relay itself.

Single and Double Pole

The K-15 Relay is a single pole, single throw assembly normally used in aircraft for switching up to 10 amperes at 30 volts.

A single pole, double throw assembly is provided in the K-16 Relay. Contacts are rated ½ ampere, 115 volts.

The K-17 Relay is a double pole, double throw assembly, with contacts rated the same as in the K-16.

All three units have coil winding, for choice of 14 volts or 28 volts d-c operation. The relays will pull in at 11 volts for 14v model and 22 volts for 28v model. Outside dimensions are 2⅜" x 4½" frontal, by 1 15/32" deep, overall. Removable covers are held by snapslides, to make for easy access to the relays and terminals. All connections are by means of solderless terminal lugs.

CAA Lets Contract for TACAN Test Equipment

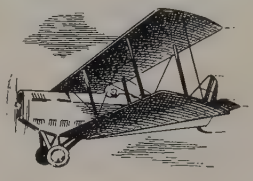
WASHINGTON—A $9,777,287.10 contract with the Stromberg-Carlson Division of General Dynamics Corporation, Rochester, N. Y., to furnish 263 sets of Tactical Air Navigation (TACAN) test, monitor and control equipment, has been announced by the CAA. The contract is one of the largest for electronics equipment ever let by the Civil Aeronautics Administration.

The test, monitor and control equipment made to CAA specifications is an integral part of the TACAN system which is being integrated with existing VOR (VHF omnidirectional radio ranges) to comprise the VORTAC system of short range navigation for civil and military flying alike. It serves as sort of watch-dog over the operation of the TACAN equipment by monitoring its ground station performance, provides the necessary facilities for service and maintenance of the TACAN equipment, and automatically shuts down the TACAN in the event both portions of the dual equipment are out of alignment.

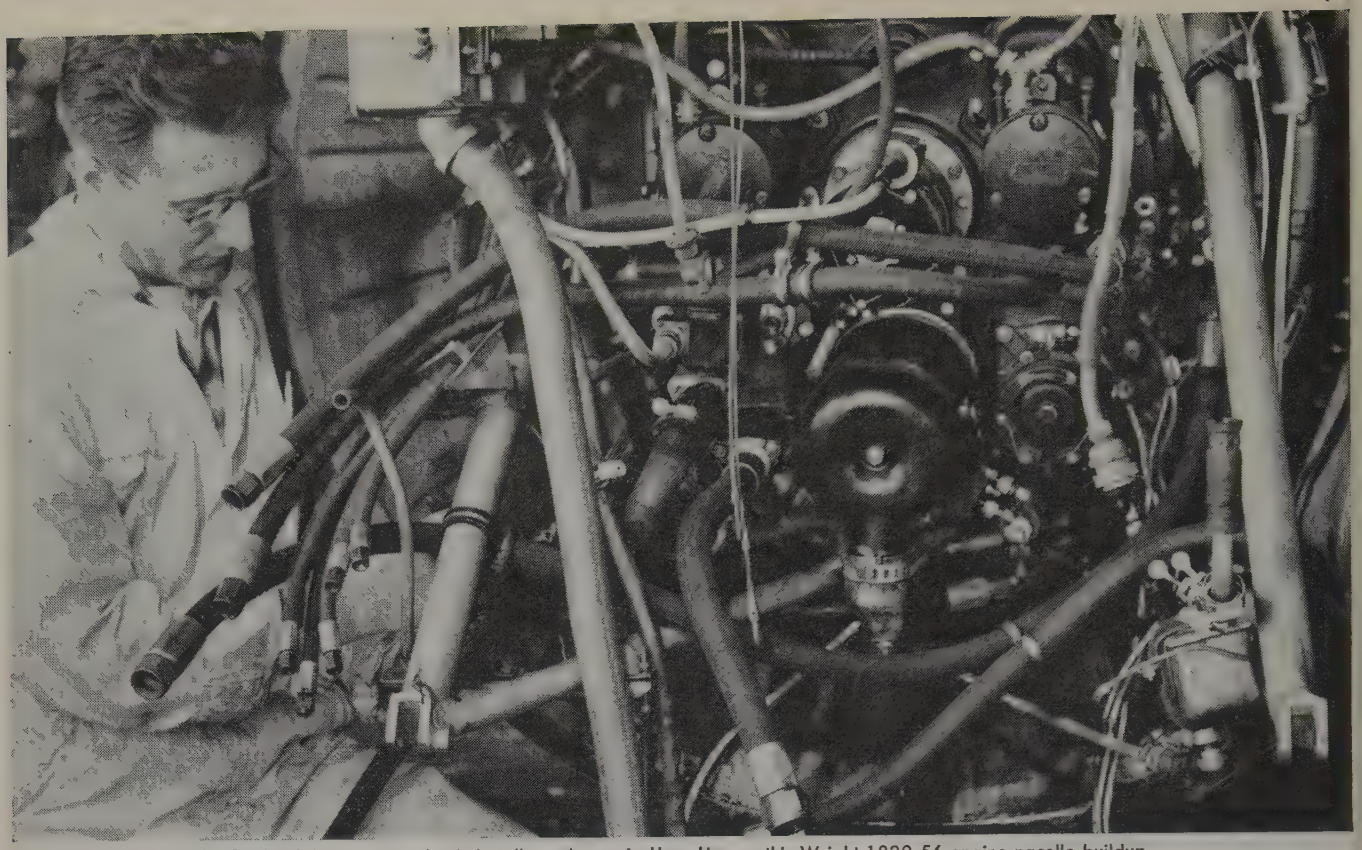
It accomplishes this by continually interrogating the ground equipment as to azimuth and distance just as though it was an airborne aircraft. In the event one part of the equipment falls out of pre-set tolerances, it tries a standby transponder and if that fails it switches to standby monitor. If all these combinations show inaccuracies, the equipment automatically takes itself off the air.

The transponder equipment which the sets in the CAA contract will monitor is under procurement by the U. S. Navy at an approximate cost of $10,000,000 for 213 dual equipments and antennas.

Target date for commissioning these VORTAC stations is July 1, 1959.



Circle or check Oct. 2, 3, 4, for NBAA's Annual Forum in Denver.



An Oakland Airmotive mechanic installs an Aeroquip Hose Line on this Wright 1820-56 engine nacelle buildup.

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Spencer Aircraft Industries, Inc., Seattle, Washington

Field Aviation Co., Ltd., Oshawa, Ontario, Canada

Lund Aviation Ltd., Dorval, P.Q., Canada

. . . . in the business hangar

■ **Pan Air Corp.,** New Orleans, La. recently completed a paint job on St. Louis Post-Dispatch's DC-3. John Matthews is chief pilot. ☐ **Plymouth Oil Co.'s** Learstar underwent periodic inspection. Chief pilot is Jim Hickerson. ☐ **Freeport Sulphur Co.'s** Mallard received complete paint job and overhaul. Dick McNally is chief pilot. ☐ Second of 8 Consolidated PBY-6A amphibs delivered to Royal Danish Air Force, after 8,000-hr. overhaul.

■ **PacAero,** Santa Monica, Calif. is now installing its Short Stack Exhaust System, Learstar floor structure, and floor board system on U.S. Steel's Lodestar N80K. Don Teel is the chief pilot. ☐ **British American Oil Co.'s** Learstar, flown in by chief pilot Jack McVicar for 1000 hr. inspection, gross weight increase from 22,500 lbs. to 24,000 lbs., new custom paint, etc. Airplane is based in Toronto, Canada. ☐ **Krupp Learstar** of Essen, Ger., is in for engine change, installation of wing fillets, and installation of Bendix ADF's. Capt. Marcel Jacob is chief pilot. ☐ **Bob Hansen,** chief pilot Krohler Mfg. Co. of Naperville, Ill., flew in their Lodestar for rudder spring tab installation, angle of incidence change, and minor modifications. Avco Mfg. Co.'s Learstar from Newark, N.J. was in for minor modifications. Bailey Case is the chief pilot. ☐ **Mr. S. Robbins** flew his Cessna 180 in for a 100-hr. inspection. ☐ **C&H Sales,** Inglewood, Calif., had their Twin Beech in for installation of an autopilot and radio rework. Jack Conroy is chief pilot. ☐ **Aero Commander of Lear, Inc.,** is in for a new custom paint job.

■ **Potter Aircraft Service, Inc.,** Burbank, Calif. recently completed 100-hr. inspections, minor modifications, and aerial spray system installation on two De Long Corp. YC-97's. De Long chief pilot is Harry Swanton; Ernie Hubbard is maintenance super. ☐ **Pacific Lumber's** DC-3 was in for 100-hr. inspection and installation of Challenger 250 modification consisting of wing root fillets and aileron gap closure strips. Chief pilot Wes Stetson reports excellent results. ☐ **Potlatch Forest's** Lodestar, piloted by Clyde Martin and Bob Stratton was in for rudder spring tab installation and routine 1000-hr. wing removal and inspection.

■ **Remmert-Werner, St. Louis, Mo.,** performed an engine change on Indiana Gear Works' DC-3. Pilot Max Jobst flew it in. ☐ **Chemstrand Corp.'s** Lodestar was in St. Louis for 1000-hr. inspection and paint job. Bob Hinds is chief pilot. ☐ **Schenley Industries'** DC-3 was in for a 1000-hr. inspection. ☐ **Mine Safety Appliances'** DC-3 was at Toledo on the Express Airport for a double engine change. Mike Nicholsen is pilot. ☐ **The Bower Roller Bearing Co.'s** Mallard was at Toledo for engine change. Bill Lomasney is pilot. ☐ Fred Hotson flew **Ontario Paper Co.'s** Super DC-3 to Toledo for a change of one of their Engine Works Super-92 engines. ☐ **Sears Roebuck's** D-18 was flown to St. Louis by Charles Russell, chief pilot, for an engine change. ☐ **Wolfe Industries'** DC-3 was at St. Louis for installation of de-icer boots, exchange of control surfaces. ☐ Bob Burke flew **Lauhoff Grain's** D-18 to St. Louis for a double engine change. ☐ **Coca-Cola's** DC-3 was flown to St. Louis by Ralph Whitworth, pilot, for engine change. ☐ **Sun Oil Co.'s** Super DC-3 was flown to St. Louis by Vern Fink, pilot, for a double engine change of their Engine Works Super-92 engines and overhaul of both props.

■ **Horton & Horton,** Ft. Worth, Tex., has completed custom interior for Convair 440 owned by George Young, Pres. Fairways Corp., Washington, D.C., winner of Best Presentation and Equip., Reading Air Show. He will charter the Convair which now has berthable seats, stowable conference tables, electric galley and refrigerator, dinnerware, table silver, Irish linen tablecloths, foam rubber mattresses, gold-striped sheets and pillow cases. ☐ Mrs. Patrick Frawley **(Paper Mate Pen)** sent their Aero Commander in for a custom "Gold Crest" interior: imported blue linen headlining, powder blue genuine leather, beige and blue tweed seats. Jim Badgett, pilot, flew the plane to and from Calif. ☐ Downtown Airpark's new Aero Commander (Okla. City) demonstrator now has "Gold Crest" red and black styling, sports red translucent plexiglas for full cabin length overhead lighting. ☐ **Ray Industries'** (Detroit) Aero Commander 520 sent by Pres. C. N. Ray for custom interiorizing in turquoise and sand beige with iridescent leather. ☐ Recent swing-bys for quick installation, accessories, etc., were Aero Commanders from Magnolia, Dallas; Bill McDavid Oldsmobile, Houston; for Formica covered thermos units, Hunter Aviation, St. Louis; Trans-Aire, New Orleans; Fort Worth Pipe Supply, Fort Worth; J. P. Mendez and Banco de Mexico, Mexico; Mene Grande Oil Co., Venezuela, for "Super Sky-Hampers" and "Skytables."

■ Northwestern Aeronautical Co., St. Paul, Minn., has Pfeiffer Brewing Co.'s Lockheed Lodestar in for complete paint job and 100-hr. inspection. Bill Heffner is chief pilot. ☐ Kearney Trecker Co.'s DC-3, piloted by Carl Kraling and co-pilot Ray Routley, is in for complete strip and paint job, 100-hr. inspection, and installation of approved jump-seat and exchange of rudder. ☐ Line Material Co.'s DC-3, Milwaukee, Wisc., was in for 100-hr. inspection and exchange of control surfaces. ☐ General Mills' DC-3 was in for 100-hr. inspection, routine, and pilot items.

■ **Aero Electronics,** Phoenix, Ariz., recently installed on Aviation Sales & Eng., Houston, Tex., Grumman Goose a Transvaal Mark IV MHF transceiver, Lear ADF-14R, Wright Exec. "60," Lear LTRA-6 with omnimeter, ARC-15C Omni, Flitetronics CA-2 Isolation Amplifier. Pilot is Johnny Hamp. ☐ Installation on Western Realty Co., Inc., Las Vegas, Nev., Cessna 182 included ARC ADF-21, Wright Executive "60" and Flitetronics, and CA-3 Speaker Amplifier. ☐ **Goldwater's Dept. Store,** Phoenix, Ariz., airplane, flown by Sen. Barry Goldwater was in for Wright Executive "60" and WLT-10 Localizer Adapter installation. ☐ The TBM of **Marsh Aviation Co., Inc.,** Phoenix, Ariz., has received installation of R15 Receiver and T11B Transmitter. Pilot is Bill Eyster.

Navicom

(*Continued from page 47*)

CAA Designates Los Angeles-Pueblo Airway

Victor Airway 210 from Los Angeles, California to Pueblo, Colo. via the Grand Canyon is now available.

The airway is based on VHF omnidirectional radio ranges (VORs) located at Los Angeles, Daggett, Cal.; Valle, Arizona; Farmington, New Mexico and terminating at Pueblo, Colorado. Of the VORs serving Victor 210 the ones at Valle and Farmington have been recently installed and commissioned.

At Pueblo, Victor 210 ties in with Victor 10 running between Pueblo and New York City.

On August 1 the portion of Victor 210 between Los Angeles and Farmington will become a part of transcontinental Airway Victor 1512 running from Los Angeles to New York. Victor 210, however, will retain its identity.

List of Weather Bureau Aviation Numbers Available

Through the courtesy of the NBAA and U. S. Weather Bureau, a list of unlisted numbers for pilot use is available.

Each number given in this list is the preferred number to call for obtaining flight weather information. It will be to your particular advantage to use these numbers when calling the Weather Bureau long distance because some Weather Bureau offices occasionally use automatic answering devices to give general local weather information during times of peak work-load. Answering devices are used only on numbers listed in local telephone company directories. To avoid getting a recorded answer, use the selected telephone numbers in the list. Certain numbers are restricted for pilot use—the telephone company operator cannot advise you on the availability of these numbers.

Weather May Be Broadcast Nationwide On Low Frequency Range For Pilots

John H. Aldrich, chief aviation weather forecast, has announced that U. S. weather is being broadcast continuously by CAA for pilot between 8:30 a.m. and midnight on the Los Angeles low frequency range, 332 kilocycles. The tapes are corrected as new weather information—forecasts and observed weather reports—is received. Aldrich says the service, if it continues to be successful and useful, will be extended throughout the nation.

CAA Airport Engineer for Northern California

The CAA Fourth Region at Los Angeles has re-established its Northern California District Office at Oakland International Airport. The Airport Engineer is Mr. Carl G. Hand.

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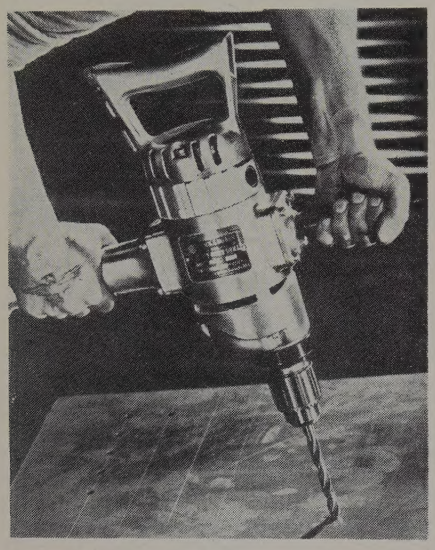
New "Polyfoam" by General Tire Designed for Cushioning, Sound & Thermal Insulation

General Tire's Marion, Indiana, plant is now in volume production of "polyfoam," new strong, durable foam product designed for use as a cushioning material and sound and thermal insulator. New product, a polyether based urethane foam, is now on order for aircraft, furniture and automotive manufacturers, as well as bedding and clothing industries, its tensile strength permits sewing or stitching directly through the material.



BLACK & DECKER'S *new ½-in. heavy-duty drill. Note handy reversing ring mechanism between nameplate and handle, as well as basic maneuverability of the tool.*

Extension & Adapter Sleeves

Pacific Automation Products, Inc., has just released a bulletin showing its line of extension sleeves and adapter sleeves for cable-connector compatibility. In addition to showing the line of fittings, the booklet contains a chart which permits accurate specifying and ordering of the exact extension and adapter sleeves required.

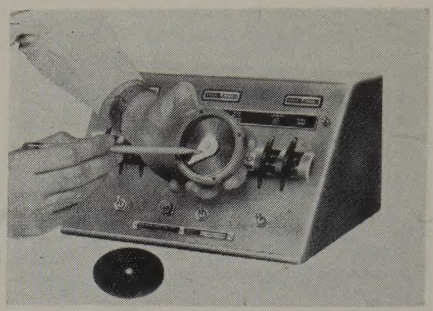
CAA Briefs Crews for Overseas

Crews ferrying planes abroad have been urged to check, in advance, with the Office of International Cooperation of the CAA, concerning special problems of their flights.

CAA's "foreign" offices have prepared special briefings relating to flight-rules and radio frequencies abroad, in order to avoid problems which have caused considerable difficulty in the past.

Gamewell Potentiometers Double As Control Wheels on New Data Analyzer

A new Standard Data Analyzer, developed by Control Instrument Co., for

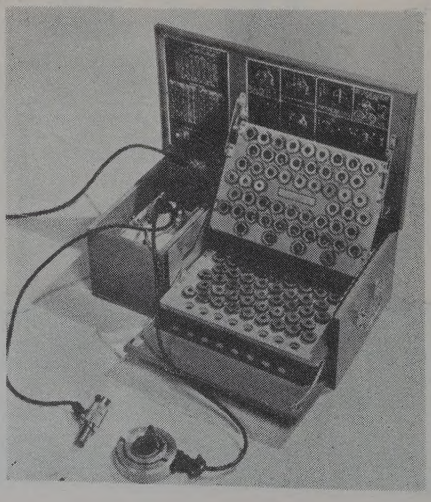


simulating and projecting machine operations, uses Gamewell RL-270A Precision potentiometers to set up and control the programming.

The Potentiometers are wired into a series of interconnected Wheatstone bridges. These, as indicated on 3 meters when balanced, provide answers to basic problems in machine tool operations. Each dial-potentiometer, which has 8 knurled wheels mounted on shafts, represents a different factor in selecting conditions: cutting speed, diameter of cutter or work; proper rpm for tool; number of teeth on tool; recommended chip load; feed rate; correct length of cut; and total machine time.

"Jigamac" Electro-Mechanical Locating Device For Precise Jig Drilling and Reaming

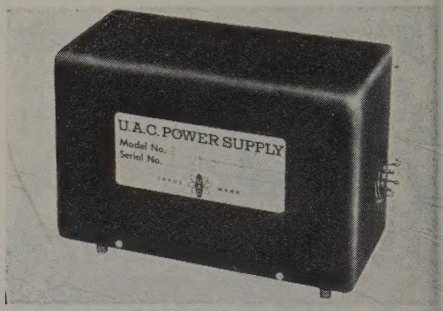
"Jigamac," new device of Wharton & Wilcocks of America, Inc., N. Y., for jig drilling and reaming precisely locates holes to an accuracy of plus or minus .0005-in. Unit is portable, weighs 43 lbs.; consists of 4½-in. circular base housing within which is internally-lighted reticled optical unit. Base's electro-magnetic coil grips any flat steel



surface at any angle. Electrical equipment, AC, is housed in its own compartment; main switch, pilot lamp and plugs are mounted on control panel; can also be operated from batteries. "Jigamac" unit includes complete control panel, accessories and 98 bushes for fractional, number and letter size drills up to maximum capacity of ½-in.

Small Power-Supplies Available

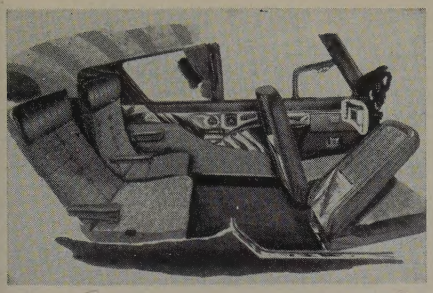
UAC Electronics, div. of Universal Transistor Products Corp., is marketing small, rugged, transistorized power supplies for filament, transistor and plate voltage applications. The units are as small and inexpensive as transformers.



Outputs to 28 VDC @ 15 amps or 2500 VDC @ 300 MA are available in standard units from 115 VAC, 60 cps, single phase; from 115 VAC, 400 cps, single phase, or from 115, VAC 400 cps, 3-phase.

New Line of Aluminum Rope Snubbers

Eastern Rotorcraft is now putting out a new line of non-corrosive aluminum rope snubbers that hold 90 per cent of the strength of the rope being snubbed. Used for securing ⅛ thru ½-in. diameter rope, these snubbers feature a positive locking mechanism that will not damage the rope. Because of the unit's high efficiency it is possible to use a lighter size rope than with less efficient snubbing devices. Primary applications for these new snubbers are: in erecting temporary transmission towers and portable antennas; tying down lightplanes, pleasure boats, tents, and other camp equipment; in any capacity where it is necessary to bind rope, such as in building and construction, power transmission, radio communication, plant maintenance, forestry, farming, boating and shipping. Three sizes are available: 1) Model SP-3089, for handling ⅛, 3/16, and ¼-in. dia. rope, weight 1.3 oz. and is 4-⅜ in. long; 2) Model SP-3120, for rope ¼ to ⅜-in. dia. weighs 4.5 oz. and is 6-⅝ in. long; and 3) Model SP-4071, for rope diameters from ⅜ to ½-in., weighs 8.5 oz. and is 8 in. long. All these models will handle hemp, nylon or dacron rope.



INTERIOR DRAWING *of Cessna's new Model 310B shows new double rear seat available as optional equipment. New airline-type seats are individually adjustable for passenger comfort. Seat belts for 3 rear-seat passengers are standard equipment. Arm rest in the middle of the seat may be removed converting the rear seat from 2- to 3-place. Front seats tilt forward and are adjustable. New map and magazine compartments are located on back of front seats. A new and larger baggage compartment with 19 cu. ft. of storage space, and a larger utility shelf, located inside cabin for smaller travel needs, are added features.*

NBAA

(Continued from page 6)

of "We stick to the rules if they are in our favor."

● Section 60.1(a) of the CAR which permits military aircraft to be excepted from the Air Traffic Rules "when appropriate military authority determines that non-compliance with this part is required and prior notice thereof is given to the Administrator" is getting a good second look from general aviation and the CAA.

● Military participation in air shows with high speed aerobatics in close proximity to thousands of spectators is one sphere in which CAA believes military could do better in their planning.

● Military insistence on training flights crossing civil airways at altitudes which detrimentally affect safe and efficient operation of all general aviation is another critical area under pointed examination.

HIGHLIGHTS *of the new Cessna Model 310B include reduction of noise level, newly designed instrument panel and instrument grouping, interior styling and comfort additions as well as a new exterior paint design. Also advanced design features are the tip-tank configuration, compact engine nacelles, the flush-riveted tail group, and electrically operated split-type flaps. Prop anti-icing and wing de-icing are all-weather utility features.*

United And Eastern Air Lines Provide Travel Contacts For Reservations To The National Business Aircraft Association Convention In Denver

As a service to those planning to attend the National Business Aircraft Association Convention in Denver, Colorado, October 2-4, United and Eastern Air Lines have set up a number of agents in various cities to assist with air reservations. The following is a list of special telephones that have been arranged to handle delegates' requests:

United Air Lines

New York City	
Ed Kennedy	MU 2-7300
Philadelphia	
Mr. McKelvey	LO 8-2800
Washington, D.C.	
Miss Brown	ST 3-4700
Cleveland	
Nick Brodella	TO 1-4100
Chicago	
Marilyn Peal	RA 6-5500
Seattle	
Miss Ellis	MU-3700, Ext. 381
Portland	
Dick Smith	AT 7-2411
San Francisco	
Mrs. Pasoke	EX 7-2100, Ext. 423
Los Angeles	
Miss Newman	MA 9-4488

Eastern Air Lines

Atlanta, Ga.	Jackson 4-2411
Birmingham, Ala.	9-6101
Charlotte, N.C.	Express 9-3311
Charleston, S.C.	4-3316
Greensboro, N.C.	4-4641
Houston, Tex.	Capitol 4-6677
Indianapolis, Ind.	Melrose 6-2501
Jacksonville, Fla.	Elgin 5-7393
Louisville, Ky.	Juniper 4-4131
Miami/Miami Beach	NE 4-3511
Mobile, Ala.	Greenwood 9-1401
Montgomery, Ala.	Montgomery 7361
New Orleans, La.	Tulane 4211
San Antonio, Tex.	Taylor 6-3231
Tampa, Fla.	7-1151

OX5

(Continued from page 41)

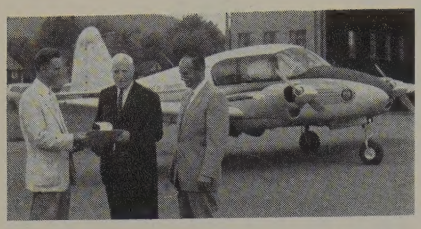
his or her wings, in planes powered by the obsolete 90-horsepower, water-cooled engine. Carroll and I envisioned as many as 25 potential members for their social group. Then came reunion day.

Veteran flyers from Ohio, West Virginia, New York and District of Columbia, bearing pressbooks and other proof of their OX5 flying time, swarmed in to present their credentials for membership. At the end of the day, approximately 100 former OX5 pilots had signed the organization register and each one had contributed five dollars for the further development of the club. Sam Bigony collected the money but he refused to carry it about. C. B. Carroll assumed the responsibility and has been club treasurer ever since. Clifford Ball, Pittsburgh airport manager, assumed the clerical duties which later led to his being elected to the office of Club Secretary.

Within the past two years, the OX5 Club has had the cooperation of the newspapers, aviation magazines and the networks as membership reached the 3500 mark and Wing organizations have been established in 30 states, Canada, Alaska and elsewhere. The California Wing, with 1200 members, is the largest state organization. The oldest member is 85-year-old Henry Kleckler of Bath, N. Y., who went to work for Glen Curtiss in 1907, after which he became the key figure in the development of the OX5 engine. The OX5 roster contains the name of just about every aviation history maker since World War One. The list includes many prominent women flyers. One, Blanche Noyes, is a National Vice President, and club founder.

Each year, the fraternity honors one of its members by naming him Mr. OX5 of the year. Arthur Godfrey won the distinction in 1956. The highlight of the 1957 Awards Dinner at Kansas City will be the naming of Mr. OX5 for 1957 and the election of officers for the coming year.

REMEMBER: NBAA's Tenth Annual Forum, Oct. 2, 3, 4 in Denver, Col.



DEPT. OF TRANSPORT *of the Canadian Govt. recently took delivery of their fourth Piper Apache. Shown here, L. to R., at Piper plant at Lock Haven, Penna., are: A. R. Pinder, Asst. to Dist. Supt. of Air Regulations, Dept. of Transport, accepting delivery papers from W. T. Piper, Sr., PAC, and Glenn R. White of Trans Aircraft Co., Hamilton, Ont.*

Airspace Utilization

(*Continued from page* 35)

of about 10 ATCS's and to extend the service into about 12 additional areas.

• AERONAUTICAL POINT-TO-POINT COMMUNICATIONS:

The CAA operates five basic communications networks for Air Traffic Control, Flight Assistance Service, and the collection and dissemination of meteorological and airway information. They are:

Service "A" (Operational Weather/NOTAMS); Service "B" (Aircraft Movement and Air Traffic Control Messages); Service "C" (Synoptic and General Weather); Service "F" (Air Traffic Control); Service "O" (International Weather).

The Plan provides for new equipment designed to increase the various systems' capacity and thereby accelerate the overall process. By FY 1960, it is expected that trunk teletypewriter system circuits for Service "A", "C" and "O" operating in the 600 wpm range will be installed to expedite express handling of weather information.

• INTERNATIONAL AIR TRAFFIC COMMUNICATION STATIONS:

The Plan will mechanize this system and thereby increase its capacity without a corresponding increase in manpower. A change from the existing printing-telegraph circuits between international air traffic control centers to direct voice channels between controllers is being programmed.

• VORTAC (Formerly VHF Omnirange and DME):

The system will be composed of ground facilities which radiate azimuthal courses in all directions from the station, using both the VHF band (VOR signals) and the UHF band (Tacan signals). The system will provide miles-from-station information by means of UHF (TACAN) replies to interrogations from airborne UHF (TACAN) equipment. Aircraft will carry either VOR or TACAN equipment to obtain azimuth guidance, and will carry full TACAN or TACAN-distance-only equipment to derive distance data from the ground station.

The Plan provides for funding of a system of 1230 VORTAC's to meet traffic requirements of 1965. Coverage on the basic route structures eventually will be upwards from 700 feet above ground, and signals will provide "all airspace" coverage above elevation 18,000 feet m.s.l. The commissioned DME's in the present system will be retained until 1960 except as a frequency or other conflict makes this impractical, but no additional DME's are planned. Existing VOR's will be modified to provide TACAN capability.

• ILS (Instrument Landing System):

It is anticipated that future development of airborne equipment may result in automatically controlled approaches down to lower minimums utilizing the ILS as the basic ground equipment. CAA anticipates a requirement for an additional 119 ILS's through FY 1961. The Plan provides for the addition of TACAN distance measuring functions at all ILS locations and the combined facility will be called "ILSTAC."

• APPROACH LIGHTING SYSTEMS:

Approach lighting will continue as a part of the Common System. Airway planning Standard No. 1, states that airports having an ILS qualify for approach lighting. Standard centerline systems eventually will supplant existing neon left-hand row and double-row systems. It is estimated that 241 systems will be required for standardization and to implement additional locations expected to qualify during the six-year period.

• SEQUENCED FLASHING LIGHTS FOR APPROACH LIGHTING SYSTEMS:

Sequenced flashing lights are very-high-intensity lights appropriately spaced along the centerline of the approach lighting system and flashed instantaneously in sequence toward the runway threshhold—running for 2,000 feet from the outer end of the approach light system to within 1,000 feet of the threshold.

(Ed. Note: IDL and EWR installed.)

Sequenced flashing lights are planned as standard for approach lighting systems where a sufficient number of instrument approaches are made under very poor weather conditions. It is planned to install the flashing lights on about 60 of the 260 approach lighting systems which are planned by FY 1962.

• LOW AND MEDIUM FREQUENCY RADIO RANGES; FAN MARKERS:

The near completion of the system of Very High Frequency omniranges should permit the discontinuance of all continental L/MF ranges by FY 1959 with the exception of 88 retained for broadcast purposes and limited navigational use. However, the *military* may not equip its fleet with the required airborne equipment by FY 1959, in which case it will be necessary to retain the majority of the L/MF ranges for their use.

The 75 mc Fan Markers are associated closely with the L/MF range system. These markers will be needed less and less as UHF distance measuring aids (TACAN!) come into use, and their gradual discontinuance is foreseen.

• LOW AND MEDIUM FREQUENCY NON-DIRECTIONAL RADIO BEACON:

Except for the limited funds included for Non-Directional Radio Beacons (ADF Homers) to meet the needs of traffic control and for occasional long-distance aids, CAA plans to install no additional radio beacons, and will discontinue the system as fast as new developments permit.

• INTERMEDIATE LANDING FIELDS:

Discontinuance of intermediate fields in the 48 states is anticipated in future years as concurrences are obtained from the military and other users. (Ed. Note: Your editor does not know of any emergency use in recent years of these facilities. But because of the increasing use of single-engine business aircraft in night operations, we would appreciate our readers writing in of any such substantiated use that has come to their knowledge.)

• AIRWAY LIGHT BEACONS:

The Congressional Aviation Policy Board, 80th Congress, recommended gradual elimination of beacons, except those serving airports. The FY 1957 budget request called for elimination of one-half of the existing airway beacons, and it is planned to eliminate the remainder as soon as practicable.

• FLIGHT INSPECTION AIRCRAFT:

CAA plans to add new aircraft and equipment to the task of checking facility performance at altitudes flown by high performance civil and military aircraft.

• TRAINING IN OPERATIONS AND MAINTENANCE:

It is planned to process approximately 2,400 new employees in basic air traffic control training at the Aeronautical Center during FY 1958. It is also expected that approximately 800 new personnel will be employed for direct assignments to field facilities for on-the-job training.

• MAINTENANCE:

Based on the present planned program of establishing additional facilities during the period fiscal 1958 through 1962, it will be necessary to employ an estimated 4,000 additional technical maintenance personnel to man these facilities and to replace the losses due to normal attrition and other causes.

The complete "Federal Airway Plan" can be obtained from the "U.S. Department of Commerce, Washington 25, D.C., price $1.00."